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T H E

Practical Husbandman:

B E I N G A

C O L L E C T I O N

O F

MISCELLANEOUS PAPERS

O N

H U S B A N D R Y, &c.

By ROBERT MAXWELL, Esq;
of ARKLAND.

Nihil agriculturâ melius. CIC.

Sola res rustica, quæ sine dubitatione proxima & quasi consanguinea sapientiae est, tam discentibus egeat quam magistris. COLUMELL.

Turn to the Arts, the useful pleasing Arts
Of Cultivation; and those Fields improve
Your erring Fathers have so long despis'd.
Leave not to Ignorance, and low-bred Hinds,
That noblest Science, which in ancient Time
The Minds of Sages and of Kings employ'd,
Sollicitous to learn the Ways of GOD,
And read his Works in AGRICULTURE's School.

DODSLEY on Agriculture.

E D I N B U R G H:

Printed by C. WRIGHT and COMPANY, for the AUTHOR:

Sold by him; J. PATON, HAMILTON and BALFOUR, KINCAID and DONALDSON, W. SANDS, W. MILLER, G. CRAWFURD, W. GORDON, YAIR and FLEMING, J. BROWN, C. WRIGHT, L. HUNTER, GRAY and PETERS, Booksellers, *Edinburgh*: A. STALKER, D. BAXTER, J. GILMOUR, Booksellers, *Glasgow*: F. DOUGLAS, *Aberdeen*: J. MORE, *Dundee*; and E. WILSON, *Dumfries*. M.DCC.LVII.

*This Book is entered in Stationers Hall; and
further to prevent pirating, I have signed each
genuine Copy on the Back of the Title-page,*
B. Thorne

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In Lock 1759

T O

THE RIGHT HONOURABLE,
WILLIAM PITT, Esq;

S I R,

AS the greatest and best Men, in all Ages, have been Lovers and Encouragers of Husbandry, I cannot hesitate in dedicating this Book to you. The Improvement of Agriculture, upon which the Success of Manufactures and Trade, the Wealth and Happiness of the Kingdom depend, being my Aim, there is no other BRITISH Subject under whose Protection I could so properly shelter it. Your disinterested Conduct, has justly acquired you the highest Esteem of every Lover of his Country. Your Approbation, therefore, (if this Treatise deserves it) must multiply the Number of Readers; their Persuasion of your great Abilities,

Abilities, and strenuous Endeavours to make them happy, will dispose them to follow my Directions: For, by your Possession of their Hearts, their Heads will be the more easily influenced to yield to Reason, and their Hands to work by the Rules which it dictates. Then Plenty and Wealth will flow on Farmers, and these Blessings will be diffused over the whole Kingdom: For every other Thing prospers, in Proportion as Husbandry succeeds, and in that Proportion only. I embrace this Opportunity of doing myself the Honour to give this publick Testimony, that, as a Lover of my Country, you have induced me to be, with the greatest Esteem and Regard,

S I R,

EDINBURGH,

JUNE 15. 1757.

Your most humble,

most devoted,

and most obedient Servant,

RO^T. MAXWELL.

T O T H E
R E A D E R.

T H E *Impression of The Select Transactions of the Honourable, the Society of Improvers in the Knowledge of Agriculture in Scotland, published by me, being sold off; this Book is partly made up of Papers chosen out of these Transactions, revised, and considerably improved: The Remainder of it, being the far greatest Part, consists chiefly of Memorials of Husbandry, wrote by me for Persons of Distinction in Great Britain, since the Publication thereof.*

Thus made up, it treats of all Soils in Scotland, of sundry in England; and so many, and so various Plans are formed in it, that every Farmer may therein find Directions for his Husbandry: Directions agreeable to just Principles, and the best Practice hitherto followed: Directions by which, if observed, Grain, Flax, foreign Grasses, and also such as are natural to our Soils, must be good and plentiful. The Shapes of Cattle must be finer, and their Size will be enlarged: The
most

vi P R E F A C E.

most dangerous Diseases of Sheep will be prevented, or cured, and their Wool will be fine: The Linen Manufacture will be independent on foreign Markets, Winds and Waves, for Flax and Flax-seeds, the Price being saved to the Kingdom: And our Flax-dressers, our Spinners, our Weavers, and our Bleachers will be preserved from the piteous Condition they would be reduced to, if the Flax, the Primum of the Work by which they live, should be lost at Sea; or if Commerce should be interrupted by Wars or Pestilence.

I have neither disregarded Dung nor Horse-hoeing; nor yet have I supported the Husbandry, which I have directed, by them wholly, but have taken the Assistance of enriching betwixt impoverishing Crops. I have corrected vulgar Errors, and formed a rational System of Husbandry. I have treated it as a Science, making Nature my Guide. I have shown that Husbandry, the Foundation and Support of Manufactures and Trade, may be, on an equal Stock, more profitable than either of them; and I have all along given Reasons for what I have said, that by the Strength of them my Work may be judged.

If

If Farmers will read my Papers with as much Attention as I have wrote them, will be convinced of Errors, will depart from them, and will practise the Husbandry which I have directed, we must soon become rich, and may be happy : But as few of them will yield to Reason, and relinquish Ways of their Forefathers which are destructive to the Ground, and so to themselves ; I have shown, how they may be covenanted with in such a Manner, that their Possessions must be highly improved, and their Profits must at the same Time become far greater than they before could be, if their Masters take Care to see the Conditions performed.

This seems to be the Plan by which Great Britain can be soonest and best improved, since few Farmers can be brought by reasoning only, to forsake Customs which are highly unreasonable and destructive : Customs, notwithstanding, esteemed for their Age, and supported by Examples shown them by far too many of their Masters ; yea, adopted by many Writers on Husbandry, who, being apparently unlearned in the Principles of it, could form no rational System, have reformed few Errors, but confirmed many, as I have in Part shown.

If

If I have used, in one of my Papers, any tart Expressions relating to the Management of The Society for propagating Christian Knowledge, I hope the Importance of my Subject, and the evident Benevolence of my Intention, will make sufficient Atonement.

Moved by the miserable State of the Poor for want of Bread, which, as I have shown, would not have happened, if the Husbandry of Roots and Herbs (which in two Memorials to them, I recommended in the Year 1743) had not been neglected; I was invincibly excited to blame their Conduct, as a Society, although I have Reason to be persuaded that many of them are Lovers of rural Industry, and, as such, of their Country. But I must think, that these, as Members of the Society, should distinguish themselves by some solemn and publick Deed, showing that they have struggled for the Promotion of the Knowledge of Agriculture, without neglecting the Propagation of Christianity: Pure Religion, universal Benevolence, the Love of Husbandry, and of every publick and social Virtue are inseparable.

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M I S C E L L A N E O U S
P A P E R S
O N
H U S B A N D R Y, &c.

*QUERIES by the Honourable Sir JAMES
FERGUSSON of Kilkerran, Baronet, now
one of the Senators of the College of Justice.*

I Have a Piece of level Ground, consisting of about forty Acres, about one Third of it is Croft-land, as 'tis called; another Third is Homing or Haugh Ground, stretched along the Side of a River; a Third is Meadow-land.

The Nature of the Croft-land is a light Ground, with a Mixture of small Stones; but not so as to be called stony Land: There is one small Part of it a good rich Soil.

The Method of using it hitherto has been, to sow it first with Bear, then two Years with Oats, then with Pease, and then with the Bear again; at which Time only it gets Dung.

The Increase is about five the first Year of the Oats, and the second not so much.

The Nature of the Haugh-ground is a rich deep Earth, with a Mixture of a Clay Nature, though not so as to be called a Clay Soil. A good Part of it is overflowed by the River in small Floods, the rest is not overflowed but when great Floods come.

The Method has been, these hundred Years past, to sow it every Year with Oats, without giving it any other Manure than what it gets by the Overflow of the River. Its Increase does not exceed three Seeds, having great Abundance of Grass among the Grain.

The Meadow is of the common Nature of Meadow-land; a sour Ground, which in general throws up a pretty plentiful Crop of Hay, and being sowed from the 1st of *March*, cuts about the 10th of *July*; but Part of it is of a very coarse Kind, called *Spret*, and in that Place it is rank and thick. Other Parts of it bear a thin Grass, and in the Goharvest and Winter Season is of a yellowish Colour, which would appear to proceed from its being too wet: Indeed the whole is of a wet spouty Nature.

It is desired of the Society to give Directions, how I may manage this Ground for the future, so as to bring it to better Account.

I have plenty of Lime, of Clay, of Moss, of Ferns, and there is a sufficient Level to any Part of the River.

The Society's Answers.

THE distinct Manner in which the Queries are proposed, makes the Solution of them the more easy. It shall be therefore made in relation to the three different States that, as appears by the Queries, the Ground is in.

As to the Croft-land, it appears by the Meanness of its Produce, that the Ground is wasted in its Strength, beyond what manuring every fourth Year is able to repair; wherefore it requires a Supply of fresh Mould, and to be rested for some Years until it recover Strength. For effectuating of which, it is advised, that so soon as the present Crop is cut, the Ground be plowed, either

ther with one strong Plough, able to raise new Mould three or four Inches deeper than has been formerly done ; or, if the Strength of one Plough cannot effectuate this by one Furrow, let it be plowed with two Ploughs following each other in the same Furrow.

It will be observed by the common Labourers, that, by this Method, the good Mould will be buried, and bad, coarse, unmanured Ground brought to the Top ; but to this the Answer is plain, That where the Deepness of the Staple admits of this Practice, the Ground that lies deeper than the Roots of the Grain commonly go, is of the Nature of Virgin-earth ; which is not only rendered fruitful by being exposed to the Winter Frosts and Rains, Summer Sun and Dews ; but also, The natural Strength thereof being washed into the wasted Soil that's turned under, occasions a new Fermentation ; which contributes to the Fertility of all Soils, and is most observable in Grounds trenched for Gardens, where Snow melts much sooner, than it does upon the Walks, or any other Part of the Garden that has not been trenched that Year ; which proceeds from the Heat occasioned by the new Ferment.

Next, Care must be taken, that no Water be allowed to stand upon this Ground in Winter ; and, so soon as the Season of the Year will admit of it in *March*, let it be well harrowed, when dry, up and down, and cross the Land, for mixing the old and new Mould together ; for which it will be proper to have a Drag-harrow of double the Weight and Strength of the ordinary Harrows. At the same Time, cause pull up and gather carefully the Wreck, or Roots of Weeds and Grass, into Heaps, upon the laboured Ground, burn them and spread the Ashes. When it is thus harrowed, and thereafter plowed for the second Time, let it be
sowed

sowed with Oats, Clover and Rye-grass ; but in regard some of it will have been two Years Oats, it will be proper that such Parts of it, after it has got its second Plowing in Manner prescribed, which may be deferred till *April*, be dunged, plowed, and sowed with Barley and Grass Seeds ; because it will be poorer than that which hath been Barley, Pease, or only one Crop of Oats since dunging : Or the whole may be summer-fallowed ; in which Case Barley may be sown first Year in place of the Oats.

It will be found, that two or three Crops will make a greater free Return, than if the Ground had been employed for four Years ; over and above this weighty Consideration, That at this Period it will be richer, and freer of Weeds, than it would without the Benefit of the Fallow.

By this Method of Procedure, the Grass-crops of this Ground will be more profitable, than its former scanty Crops of Corn, after the annual Charge of Seed and Labour is deduced ; and by turning of this Croft-land into Grass, the Labour and Manure that has yearly been bestowed upon it, may be employed in improving and enriching the other third Part, and bringing it into Crofting.

As to which other third Part, 'tis advised, That it be dressed, dunged, sowed with Grass Seeds in Manner prescribed, and turned off to be ley or Pasture ; because, when it is in Grass, the Water-floods will be a constant Supply to its Fertility ; whereas, when such Grounds are opened by Tillage, the best of them are washed away by the Floods ; but Care must be taken, to lay it out in such a Manner as no Water may remain upon it after the Flood has abated.

Or, as by the Method in which this Ground has been managed, it appearing that the Strength of it is exhausted, and the little that remains is devoured by Couch Grass, or Quickens, and
other

other Trumpery that has got Possession of the Ground, through bad Husbandry, 'tis advised to plow it before Winter, as deep as the Plough will go; and in *April* or *May* next, when the Grass happens to appear, let it be plowed again, as deep as formerly, and sowed with Pease; which, when beginning to swap, or to have Pods, plow down, and cover under the Fur; and let it ly in this Condition all Winter. Such Parts of it as can be well dunged, may be sowed with Barley, and the rest of it with Oats; but if it be inclosed by itself, it were better that such Parts of it as cannot be dunged and sown with Barley, were sown with Turnip, some time in *June*, by a Drill-plough, in Rows, leaving four Feet of Intervals between the Rows, for Horse-hoeing. Which may be performed thus:

Before the Mark of the Drill-plough become indiscernible, (for some Weeds are so like Turnips, while they are both young, that it is at least very difficult to distinguish the one from the other) take a Hoe-plough, with a notched Muzzle, which will give Opportunity to yoke the Horses so as the Fur may be made sufficiently near the Row of Turnips, and plow from them one single and a very light Fur along each Side of the whole Rows: Then unyoke your Horses, and when the Turnip-leaves are come to be about the Breadth of half a Crown, cause a Man go with a Hand-hoe six Inches broad, and single the Turnips to that Distance or more from one another, leaving the strongest Plants as often as it can conveniently be done.

In a short Time thereafter, yoke your Hoe-plough again, till up the Intervals, and let the Plowings be repeated as often as the Weeds rise to a Height, or be covering the Ground, the oftner the better*.

As

* Or rather take the Method directed by Mr. Tull, in his Chapter of Turnips, where he says, "It is beneficial to hoe Turnips

As in this Method, the Turnips standing close to one another on two Sides, when full grown, the Field will contain near as many as when in the Hand-hoeing Way they are parted to proper Distances ; so they will grow larger in Proportion to the greater Quantity of Earth raised by the Horse than Hand-hoeing ; and, when confined by one another, will even unite, and swell out, notwithstanding, into the Intervals, to the Weight that the Earth can produce or raise them ; because much more Earth is thereby exposed to, and impregnated by the Benefits of the Atmosphere, and by the Salts that it therefrom receives ; and that by the Contusion of the Plough it is pulverised, and therefore gives the more Pasture and Food to the Plants. The more that is raised, the Ground for these Causes receives the more and greater Advantages of a Fallow, even with respect to the succeeding Crops ; and

“ Turnips (especially the first Time) alternately, *viz.* To hoe
 “ every other Interval, and throw the Earth back again, before we hoe the other Intervals ; for by this Means the
 “ Turnips are kept from being stunted, because this alternate
 “ Hoeing doth not at all endanger the Roots by being dried by
 “ the Sun, for whilst one Half of the Roots have Moisture,
 “ 'tis sufficient, the other Half will be supplied from those,
 “ so they will soon take hold of the Earth again, after
 “ being moved by the Hoe ; and it is better to have Nourishment
 “ given them moderately at twice, than to have it all at once,
 “ and be twice as long before a Repetition.

“ Sometimes, when Turnips are late planted, this alternate
 “ Hoeing suffices without any Repetition ; but when they are
 “ planted early, it will be necessary to hoe them again, especially if Weeds appear.

“ Tho' the Earth on each Side the Row be left as narrow
 “ as possible, yet it is very profitable to hoe that little with
 “ Bidens, here called a Prong-hoe, for this will be sure to let
 “ out all the Roots into the Intervals, even such as run very
 “ nearly parallel to the Row ; but we ought not to use the
 “ Bidens for this Purpose, before the perpendicular Roots are
 “ as big as one's little Finger.

“ This

and the Horse-hoeing, as it is in our Opinion the better Way, on all other Considerations, so it is cheaper than the Hand-hoeing.

We don't remember to have seen Turnips generally so large, or so great a Weight of them upon the Ground in the Hand-hoeing Way, even in the richest Gardens, as they are in the Fields; particularly as many of us have observed them in the Earl of *Stair's* Farms, both in *Lothian* and *Galloway*, upon indifferent Ground, in the Horse-hoeing Way; but you may satisfy yourself, by trying both the Horse-hoeing Way after drilling, and the Hand-hoeing Way after sowing with the broad Cast, and then no doubt you will hold to that which you find to answer best in your own Practice: Only, before you determine yourself, it is reasonable you should examine if you have executed both Methods with equal Care and Exactness, and consider, if both Turnips were sown at the same Time, on equal good Ground, and in all Respects equally well prepared, that the Difference may be imputable to

“ This alternate Way of hoeing Plants that grow in single
“ Rows, is of such vast Advantage, that four of these, which
“ are but equal to two of the whole Hoeings in Labour, are
“ near equal to four whole Hoeings in Benefit, for when one
“ Side is well nourished, the other cannot be starved.

“ Besides, where a great Quantity of Turnips are to be
“ hoed, the last hoed may be stunted before the first are finished,
“ ed, by whole Hoeings; but yet sometimes the Weeds, or other
“ Circumstances, may make it proper to give them a
“ whole Hoeing at first.

“ In this alternate Hoeing, the Hoe-plough may go deep,
“ and near to the Row, without Danger of thrusting it down
“ on the left Side, whilst the Plants are very small; but tho'
“ this deep Plowing so near to the Row is very beneficial at
“ first, yet afterwards, when the Plants are grown large,
“ and have sent their Roots far into the Intervals, it would
“ almost totally disroot them, and they, being Annuals,
“ might not live long enough for a new Stock of Roots, to
“ extend so far as is necessary to bring the Turnips to their
“ full Bigness.”

to no other Cause, but only to the different Effects of the Husbandry.

The next Thing to be considered is, Which is the most proper Way of spending of them? for they are Food for either Man or Beast. But, in the present Case, where the Improvement of the Land is so much intended, it is fittest to do it by Sheep; and for this Purpose Mr. *Tull* has directed two Methods.

“ The first is, to divide the Ground of Turnips
 “ by Hurdles, giving them Leave to come upon
 “ no more at a Time than they can eat in a Day;
 “ and so advance the Hurdles into the Ground dai-
 “ ly, until all be spent. But we must observe,
 “ that they never eat them clean this Way, but
 “ leave the Bottoms and Outsides of the Turnips
 “ they have scooped in the Ground. The Bottoms
 “ People pull up with Iron Crooks made for the
 “ Purpose, but their Cavities being tainted with
 “ Urine, Dung and Dirt from their Feet, though
 “ the Sheep eat some of the Pieces, they waste
 “ more, and many the Crooks leave behind them
 “ in the Earth; and even what they do eat of this
 “ tainted Food, cannot nourish them so well as
 “ that which is fresh and cleanly.

“ The second Method is, to move the Hurdles
 “ every Day as in the first; but, that the Sheep
 “ may not tread upon the Turnips, they pull them
 “ up, and then advance the Hurdles as far daily as
 “ the Turnips are pulled up, and no further. By
 “ this Means, there is not any Waste made, as in
 “ the other Way; the Food is ate fresh and clean,
 “ and the Turnips are pulled up with less Labour
 “ than their Pieces can be.”

This ingenious Gentleman, in his Chapter of *Turnips*, which contains these two Paragraphs, has, in our Opinion, handled this useful Subject very accurately; he having there said so much upon it,
 and

and with so much Reason, we think it needless for us to say any more.

As to the last third Part, the Management of it will be more chargeable ; but, if rightly gone about, will make a proportional Return with any of the other two. By the coarse Grass and Sprets that it produces, it appears, that the Ground is overcharged with Moisture, proceeding either from cold hungry Springs in itself, which want Vent or Passage, or else from external Floods of Water or Rain that remain upon it, and, by an Overcharge of Moisture, corrupts that sweet and natural Nourishment that is proper for producing a sweeter and richer Grass ; which last is probably the Case of such Parts as appear scalded or discoloured, and the Grass thin. If the last be the Case, proper Drains must be made for carrying off any superfluous external Moisture. But if the Moisture be natural to the Ground itself, as what you call spouty Land, then a Drain must run from the lower Part, of a proper Deepness ; and smaller Drains from that to such Places as appear to be the Heads of these Springs, which will be known by being more boggy than other Parts : The Drains must be cut so deep, as to reach the Metal in which these are, such as Gravel, Sand, &c. upon the first touching of which, the Water will be found to run off more freely and in greater Quantity. Having thus run these Side-drains into the principal Drain, let them stand open for some time, until the Quantity of Moisture abate ; and then let them be filled up with tumbling Stones, for about a Foot and a half, or two Feet ; the Drains having been made so deep that the Stones may notwithstanding be a full Foot below the Surface : Then cover them with Turf, the green Side down, or with Heath, Tops of Broom, Whins, Straw, or any other Thing you can most conveniently

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get,

get, and may judge proper to keep up the Earth until it consolidate, from falling in among the Chinks of the Stones ; through which, if it do not fall in among them, the Water will pass, the Drains prove effectual, and the Plough, after the Earth that was turned out is put above all, will go freely over, without being opposed by the Stones.

Where Stones are scarce, Faggots made of any Kind of Coppice, or Branches of any Sort of Trees, are sometimes substituted in their Place ; but they don't continue to answer the Purpose so well, because they decay and rot, the Earth falls down, and the Drains are stopt. It is to be observed, that where there is any great Quantity of Water to be evacuated, the main Drain, into which the smaller Drains are to empty themselves, is by no means to be filled up, even with Stones, unless it be both very deep and very wide, and that you have a great Quantity of Stones to throw into it, lest it should not be able to discharge the Water ; in which case the whole Work will prove worse than useless, because a Remedy is very difficult through occasion of the Stones.

After this, the whole Field may be fallowed, and plentifully limed ; or else, which is better, pared and burnt : Then a competent Quantity of Lime being added to the Ashes, and the Ground being plowed two or three Years for Corns, whereof it will yield large Crops, it may be laid down with Grass Seeds, and turned again into Meadow, with Success ; so to ly, unless it turn sour or foggy. But, if you find it apt to do so, which it is hoped the Draining will prevent, it is our Opinion, that it is better to keep it alternately under Grain, and Grass from Grass-seeds sown.

If the Meadow-way were only to be prosecuted, the Trouble and Expence of Labouring might be saved, if a sufficient Quantity of Dung, Lime, and
fat

fat Earth were compounded, sufficiently fermented, and pulverised in Middings by frequent Turnings: which, after it is thus prepared, is to be laid upon the Field: If the Earth that comes out of the main Drain be reduced to Ashes, or if any other Ashes can be got, and added to the Compost, they will by their Salts heighten the Fermentation and Pulveration, and so the Value of the Manure. But the first Method we think is still preferable; because, by the Mixture of the Soils, and the Exposition of them to the Benefits of the Atmosphere, the whole Body of the Earth, so far as the Plough goes, is enriched; the Grasses of bad Kinds are destroyed, and others, of better Species and Qualities, put in their Places.

Whatever Quantity of Earth may still remain in Heaps by the Sides of any of the Ditches, and so prove an Incumbrance on the Ground, or, if the Ditches be open, will be apt to fall in, it is fit, for these Reasons, that it should be carefully spread; as also because, being more exposed, it will the more readily imbibe the Nitre, and Spirit of the Air; which dissolves, pulverises and impregnates all Soils more or less, as by Pulveration they are made fit Recipients of it; whereby what would otherwise be troublesome, attracts fertilizing Particles, and so becomes of a fructifying Nature, and useful as a Dunging.

I have had the Honour to wait on his Lordship, upon the Ground described; and by what was then, and, as I am informed, is since done, it is well improved; as also upon the Muir above his Lordship's House, of about 500 Acres Extent, all lately well inclosed, in which Muir there is Plenty of Limestone easily come at.

With respect to this Muir, his Lordship is going on in a way, in my humble Opinion, highly approvable,

provable, *viz.* by paring, burning, and liming, the Ground being fit for both; or at least, where the Soils happen to vary, for Improvement in the one or the other way, which his Lordship wisely considers and distinguishes; and after three Crops at most, he lays the same down with Grass-seeds.

No small Part is already improv'd in Manner mentioned; and the large Crops got, give great Encouragement to proceed: Yea I doubt not but his Lordship will find, that by the Time the whole Design is finished, three Crops will have paid not only all Expences, but also the Value of the Property as it lay unimprov'd, one Part being considered with another; and that the Ground will be more than six times the Value of what it was, or ever could be without Improvement, and with a Coat of Heath upon it.

I am well informed, that his Lordship has had vast Crops, even ten Seeds and upwards of Oats; and that the Farmers in the Neighbourhood, who, until they saw what he did, and what Crops he got, never so much as once fancied, that such barren-like Ground was a Subject proper for Agriculture, begin to copy after him. Certainly such praise-worthy Examples, attended with so remarkable Success, ought to spirit up all Men who have Opportunities to do as his Lordship so commendably does, though they should have no Regard for the Publick, or even little for their own Posterity: For who can be insensible of that Weight and Dignity which Wealth (and surely this is a pleasant, ready, and most innocent Way of getting it) adds to their Characters, Counsels, and Actions?

QUERIES

*QUERIES by Sir ARCHIBALD GRANT
of Munymusk, Baronet.*

I Have a Field, of sixteen Acres, which is abundantly dry, or can easily be made so. The Soil is good, free, black Mould, without any Mixture of Moss, and about two Feet deep. For these three Years past, it has produced Clover and Rye-grass, but cannot now be pastured, because of young Quicks and Trees set around it, which have no Fence from within the Inclosure; And there is a Difficulty of turning it into Tillage and Corn, for want of Dung. It is at sixteen Miles Distance from Lime, and twelve from the Sea. There is indeed, at the Distance of half a Mile, a rich blue Clay, stained with dark Spots, which very much resembles Marl, and is found in low wet Ground, about three Feet below the Surface.

This being the Case, how can I manage this Field to most Advantage, and preserve the young Hedges and Trees? How can I most effectually manure it, and at least Charge, having neither Dung, nor Lime, nor Cattle to carry the Marl, though it should be thought proper, unless the Advantage from it would allow of the Expences of hiring Horses?

The Society's Answer. Dated in January.

Holding the Ground sufficiently drained, and the Soil as described, it is advised to plow it with all convenient Haste, that so it may have got three Furs betwixt and the latter End of *April* or Beginning of *May*; the first to be cloven, the second a cross Fur, the third to be gathered. On which last sow Pease, immediately after every Day's plowing;

plowing; because, if the sowing should be delayed until the whole Field was plowed, what was first plowed, would be so withered and dried at that Season of the Year, that it would retard the quick springing up of the Pease, if not totally lose them if a Drought should ensue. Two Thirds of the Field is to be thus managed, and sown with Pease for a Dunging.

When the Pease come to be plowed down, which is when they are in their full Bloom, they are to be pressed flat to the Ground with a Roller; and in case of the want of that Machine, Harrows are to be yoked, and put upon their Backs, and dragged over the Field; or an old Door may be used, which will in some Measure supply the want of a Roller. Immediately after they are laid flat to the Ground, they are to be plowed down by a cleaving Fur, which is the readiest Way to bury the Straw.

That the Plough may not choke, and may go the deeper and the more equally, in order to cover the Pease the more effectually, there must be one to go along with a Plough-staff, or Fork, to clean the Plough, and to thrust all the Pease that remain above Ground in below the Furrow.

This is a good Method to get a Crop of Pease for enriching the Ground; but it will require five Furrows, three before sowing, one to plow them down, and a fifth gentle and narrow plowing in the Middle of *August*, or at furthest the Beginning of *September*; against which Time it is humbly thought they will be rotten, or at least the greatest Part of them. It is further to be observed, that your Furs in fallowing and preparing for sowing, as also the Seed-fur, should be all given in the driest Times.

On the last made Fur, you are to sow Rye-grass and Clover, *viz.* twelve Pounds Clover, and two Bushels Rye-grass, to an Acre; and that within the
Time

Time limited. You may sow Rye-grass any Time in *September*: But we think it is best to sow more Clover than Rye-grass, where the Ground is not designed for Pasture; because Rye-grass, where it is constantly mowed, impoverisheth Ground. If the Field is to be sown with Clover only, sow eighteen Pounds, and four Bushels if sown only with Rye-grass. These, indeed, are greater Quantities than the *English* Writers allow; but our Acre is larger than the *English*, their Ground is in better Heart than ours, and, generally speaking, it is thought there is no Loss in giving liberally of Seed.

If the foregoing Method be thought too expensive for you who want Cattle for labouring, you may save the cross-plowing. But if the Pease be not sufficiently rotten before the 1st of *September*, the Ground is to ly fallow until the Spring: Then, sow it with Barley, if the Pease plowed down were strong: If they were bad, sow the Grass-seeds without Grain. Though they be sown with Grain, the Quantities prescribed are nevertheless to be sown, and the Grain should be sown thinner than usual.

These being the Quantities of Grass Seeds, and Methods of sowing them generally practised, we inclined to mention both; because we think it dangerous to make Innovations, except upon weighty Considerations. But Mr. *Maxwell* thinks, not only that the Quantity of Clover-seed is too great when the Grass is designed for Hay, but also that it is best to sow it with Grain. And he wrote an Essay, at our Desire, on the Nature, Qualities, and different Methods of improving Moss, and on sowing Grass-seeds; which having been well received, shall have a Place in this Book, and is referred to. There Reasons are given for sowing a far less Quantity.

Moreover,

Moreover, he still insists upon it, that this Method succeeds well in his own Practice, and with others who have taken his Advice.

He remarks, that some have affirmed even in Print, that the more Clover-seeds are sown on a Field, the better will the Crop be ; and says, he cannot help thinking, they might as well have advised to sow upon a Field all the Corn that came off it, though the Crop had been large ; and then that it is plain to the most simple Husbandman what would be the Consequence ; as also that it must be obvious to every body, that Clover-plants, when they have Room to grow, tiller or stool, and employ more Ground than those of Corn ; and yet that he has seen a Man sow even for Hay thirty Pounds upon an Acre, and could not persuade him to the contrary ; because, he said, he would walk by a printed Rule, and make sure of a good Crop, be the Charge what it would.

The Event, he says, was, that he had a bad one ; for at least five Plants of six that came up failed. The stronger oppressed and robbed the weaker, till they died of Famine ; but, struggling for the natural Support of Life, they half-starved the stronger in their Youth, and so they could never thrive so well as otherwise they would. This is more or less, says he, the Case of all Plants, the Seed whereof is sown off-hand in the Kingdom.

He alledges, that all who think reasonably on it, will easily be persuaded, that (not to speak of Clover alone) one of six of most, if not all Seeds, tho' equally fresh and good, that are sown in this Way, send not their Produce to Maturity : That surely there is some Course to be taken in a great Measure to prevent this Damage ; and that more Judgment and Dexterity with respect to the sowing is one. He says, that he could go a great Length to excuse such implicate Believers as the
Person

Person he speaks of was, if they would adhere as stedfastly to good Rules, as they do tenaciously and incorrigibly to such as cannot stand the Test of Reason; and then he adds, That, would People only allow themselves to think and examine till they find out what is the right Way of doing Things, making Reason, fully exercised, Judge, and Custom no fixed Rule, since 'tis often wrong, and then proceed with Care, Diligence and Exactness, Matters would go far better; but that this few will be persuaded to do, and so they go on in the beaten Path; and who can help it?

He owns, however, that the sowing of Clover is so commendable Husbandry, both with regard to the Value of itself, and the Preparation it gives the Ground for Grain, it being of a meliorating Nature, that he thinks it is not amiss to show different Ways of sowing it; because, if People could once be brought to do it any way, perhaps, they may the rather be afterwards persuaded to do it the best: Yet, as he cannot give his Assent to sow it alone, he hopes it may be useful to offer some of his Reasons why he thinks it may more profitably be sown with Grain.

That this Question, Whether with or without Grain? may be viewed in the clearer Light, he lays down a few Propositions, which he thinks cannot reasonably be denied: Such as,

First, Clover should be sown on no Ground that is in such a bad State, that with the Assistance of a good Fallow cannot be supposed to be at least in a Condition to bring four Seeds of Grain; and that it is bad Husbandry to sow it on Ground that is not in a Condition to give so much.

Secondly, One Year's Fallow, tho' as good as it can be made, cannot destroy the Seeds of Weeds so fully, but that there will still be a vast Stock of them, which will rise and prosper upon an after-plowing,

plowing, unless something be sown that may be able to contend with, and overcome them.

Thirdly, If you cannot destroy them all, then they will grow the faster, the richer the Ground be, and the better Preparation it has got. He observes, that the simplest Country Man knows, and says, if you do not fill the Ground, that is, if you do not put a Seed upon it, which is able to draw as much Nourishment as the Ground will yield that Season, it will fill itself with something, *viz.* Weeds.

Now, says he, if it be true, that, as is said, the Ground, if laboured, will produce, do what you will to prevent it, something proportional to the Qualities of it and the Preparation it gets; and likewise true, as he is satisfied it is, that Clover, sown without Grain, considering how weak and tender it is the first Year, does not extract from the Ground one third or fourth of what Barley and Clover or Oats and Clover would, the Clovers of all Kinds being much fed by the Atmosphere: Then he thinks it must follow, that, if Grain be not sown, it must produce Weeds in Proportion to what Grain would have grown if it had been sown; which Weeds hurt and choke the Clover more than Grain could, if one Third or Fourth of the ordinary Allowance of Seed was with-held, as it ought to be when Clover is sown; with this further Difference, that Grain, as it gives the Clover a due Proportion of Air, so it preserves it while it is young, weak, and tender, from excessive or scorching Heat and Drought, and, when cut, being only annual, the Stubble and Roots rot, dung the Ground in some Measure, and so make the Clover grow the faster; and until the Stubble decays, it shelters and keeps it warm: Whereas the Weeds are generally perennial; and being natural to the Soil, and hardier in their Nature, stand the Winter, verifying our Proverb, that *ill Weeds wax well*, and live and thrive better

better than the tender young Clover, still struggling and wrestling with it till they overcome it.

More, he says, might be said, but that this seems sufficient; and that if it be laid in the Balance with any Thing that can be said against it, he believes it will be found of the greater Weight, especially if the Value of the Grain be laid in the Scale with his Arguments, and that of the Weeds in the other.

Some, however, he owns, may have got a Crop even in this Way, which they thought was good, if the Ground was cleaner than ordinary. But how know they, says he, but that if Grain had been sown, the Clover had been better? Wherefore the strongest Arguments should prevail.

Here, and in the Essay you have an Account of his Practice, his Observations, and his Reasons: So, after deliberate Consideration, you may either follow his Method, or that first mentioned; or you may take the good Advice given in a Case of still greater Importance, *Try all, and hold that which is best.*

The other third Part of the Field is to be plowed three Times, as directed for the first Management of the Pease, because it must be made very fine for Turnips; then the Ground being broke in by Harrows, (lest the Turnip-seed, falling into deep Furs, should perish,) it is to be sown, and the Ground to be harrowed out. Three Pounds are sufficient for an Acre.

This Seed should be sown in the Time of a moderate Rain, or immediately after it; but if the Season continue long dry, and the Time of sowing be like to go over, it is advised, rather than to wait too long, to steep the Seed in soft Water ten or twelve Hours, then to dry it with powdered Chalk, and so to sow it immediately.

If, after harrowing and dressing the Ground, there remain any Clods, they must be broke with

a Roller after a Shower, or by a Clod-mell. Tho' it is generally thought, that the natural Soil for Turnips is light sandy Ground, yet there seems to be no Reason to found Exceptions against other Soils, provided they be cultivate as they ought: For, by an Experiment mentioned in the *Transactions of the Royal Society*, n. 360. p. 974. it has been found, that on Moss or Peat-ground, Turnips have by Growth increased $15,990\frac{1}{2}$ Times the Weight of their Seeds each Day they stood upon it: Besides, it seems truly a little difficult to know to a Certainty, which of several Soils that have equal Advantages by the Sun, is more natural to any one Plant than another Soil might be made, unless the several Powers Plants have of Suction, imbibing, and Digestion were better known, than we believe they are, or can well be; for it is thought that all Plants take, without Distinction, such Particles of Earth as come accidentally in contact with their Roots, if they happen to be so small that their Orifices, or the Mouths of their Vessels, can receive them.

By Observations and Experience, it seems that some Plants are thirstier than others, and therefore require more Moisture; and if Turnips be one of those, it does not show that a Soil that is naturally light is more natural for them than another Soil might be made; since light Ground is generally drier, and more apt to scorch.

It is true, Turnip, and we believe all Seeds, small Seeds especially, thrive best on Ground whose Mould is fine, if the sowing be with Judgment; and therefore, as Ground is commonly prepared, light Ground is fitter and better for them than Clay, because it is naturally more mouldy, or more easily made so. But why may not Clay, even without the Assistance of any Manure, be made finer by the Plough, Harrow and Roller, than what

what we call light Ground, since it has less Gravel or Sand in it? And if it can, as surely it may, be reduced to more Dust, or vegetative Particles, than light Ground can, by the Use of these, the Husbandman's Instruments; why ought it not to be fitter for Turnips, or any other Plants, if it gets the Preparation requisite for the several Species of them?

Since we wrote this, we have discovered, that the Sentiments of the *Irish* Society, set up lately in Imitation of ours, and what is here delivered, are near the same with respect to Clay, tho' we have happened to express ourselves differently.

Before we go forward, we think proper to recommend particularly, that the Preparation by Plowings for Turnips and all tap-rooted Plants be as deep as possible, that their Roots may the more easily descend, and draw the greatest Part of their Nourishment from Earth untouched by the horizontal Roots of Grain. Indeed, if deep Plowing be neglected, it seems reasonable to think, that Turnips might thrive better on sandy Grounds or Moss, than on Clay; because these Earths, tho' unstirred, are more penetrable by their Roots, than solid Clay; but deep Plowing and Pulveration are Remedies for this, and most Difficulties respecting Husbandry: If these be not neglected, the Turnips will find Food enough within the Reach of the Plough, and then we doubt not but they will grow to the Bigness that otherwise they would; for, if their Roots be shorter, the less Food will be spent upon them, and they will be the nearer the greater Provision of it; and therefore it may, we think, not unreasonably be presumed, that their Bulb (the most profitable Part) will be the larger: Besides, tho' they were on a sandy light Soil, the Earth, we know, lies all *stratum super stratum*; but there is no determining without Trials, how thick
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each *stratum* is, or which is the next; and therefore, as Clay, or a bound Gravel, may be immediately below a thin *stratum* of Sand, it is evident, that to make sure Work in all Events, it is necessary to pulverise well, and always to plow deep, while you find good Earth of any Sort; unless the Ground has been lately dunged; which is perhaps a single Exception from this Rule of deep Plowing: The Reason is, Dung unincorporate with Earth is apt to subside below reach of the Plough or horizontal Roots of Grain.

In *July*, they will be fit for hoeing, if thriving; which you will know by their knitting, and driving off their spire Roots. You are then to enter the Field with a Hoe four or five Inches broad in the Mouth. The Man who hoes them, puts his Foot on the fairest Plant, hoes round so as each Turnip may stand upwards of a Foot from every other Turnip, and draws a little Earth in towards the Turnip he has his Foot upon; and so continues the Work over the whole Field. By this Method it will be cleaned of Weeds, and the Turnips grow big and strong. If your Ground has been carefully plowed and prepared, and the first hoeing well done, we think there will be no Occasion for a second, since the last Crop it produced was Clover; but, if the Land grow foul with Weeds, you must hoe it a second Time. A small Part of the Field may be left unhoed, so as you may be able to judge, by that Experiment, what thick growing Turnips do towards mending of the Field, and which of the two Ways proves best.

This last Experiment is only, if ever, to be tried, where they are not to be spent. The Turnips in this Case are to be plowed down in the Spring; and if they have been strong and good, you may conclude your Ground to be in good Heart. In *April*, whether they have been great or small,

small, sow Grass-seeds in such one or other of the Ways mentioned as you think most reasonable.

Having, in the Answers to the Lord *Kilkerran's* Queries, p. 5. directed the sowing of Turnips by the Drill-plough, and how to horse-hoe them, to which we refer; we thought only proper here to prescribe the more common and ordinary Way of sowing with the broad Cast, and Hand-hoeing.

Here or there, so far as we remember, having laid before you the Process of the Turnip-husbandry, you have Opportunity to judge of the Reasons offered by us for these several Methods, that your Practice may be the more rationally determined.

It is not advised to marl with hired Horses, because we are afraid all the Improvement it could make, would not discharge the Expences; the Marl being at such a Distance, at least three Feet deep in wet Ground, and the Qualities of it never tried by any Experiment.

A QUERY by Mr. SCOT of Rossie.

I Have presently in my Possession an Island inclosed by two Arms of the River *Southesk*. It is about a Mile in Circumference, almost in a circular Figure, containing in all about fifty Acres; and has paid, for Time out of Memory, ten Bolls Bear, and twelve Bolls Meal.

The Infield is divided into three Parts, about eighteen Acres in all: One half thereof is thin clay Ground, the other a thin black Soil. The Outfield contains thirty or thirty-two Acres, very dry and sandy, and riseth a little higher than the South-side, which is the Infield.

It was always laboured by six Oxen and four Horses, and kept about seven or eight Cows and sixty Sheep. The Infield got nothing save the Winter-

Winter-dung, and the Out-field the Summer-dung, with a little Wreck or Sea-ware cast into the Side of the Island by the River. The Bear and Oats it produceth are nothing inferior to any in this Country; but it being surrounded by the Arms of the River, I am afraid, I could not procure Dung from the Town of *Montrose*, which is near a Mile distant, without too great Expence.

There is on the other Side, within Flood-mark, a sort of blue, slimy, cold Clay; which, if thought proper, I could get, with Lime, at a reasonable Expence. I intreat your Advice how to manage this Island more profitably.

The Society's Answers. Dated in January.

WE are of Opinion, that, considering the good Situation of this Island, and the many Conveniencies of its being improven, it may be managed to good Profit in Manner following.

This Field seems to be well adapted for Grass, seeing it brings it very early, lies very warm, and is naturally inclosed. Therefore it is advised, to plow up, before or against the Middle of *May*, ten or twelve Acres of the Outfield for Summer-fallow; which must be cross-plowed in *July*, to all the Depth it can be got; and as much Dung is to be procured from *Montrose*, to mix with Lime, Sea-ware, and that slimy Clay, as will dung it well; for Manure is upon no Occasion more profitably bestowed on Ground, than when the Design is to lay it down to Grass; because the richer the Ground be made, the more and the richer Grass it will produce, which will feed the greater Number of Cattle, and the better: The more Cattle that it keeps the first Year, and the better that they are fed, the more Dung and Urine from them will fall upon and enrich it; and therefore it will keep
more

more Cattle, and as well, the second Year; and so forth, it will continue long, for the same Reason, to keep more and more Cattle yearly. Besides, the richer the Ground be at first made, and the richer it grows afterwards, proportionally will its Attraction and Suction of the heavenly Influences be.

These Observations make it obvious and plain, that it would be unreasonable to grudge, and imprudent to save the Expence of all the Dung from *Montrose* that will be necessary for your compost Middings; since we believe it cannot be very immoderate, the Distance being small, and, for the Reasons given, the Use of the Dung must be very beneficial.

The foregoing Directions being followed, harrow the fallowed Ground in *August*, lay on and spread the Mixture of Manures, plow them down, sow with Rye, and yellow or white Clover, with Rye-grass, suitable to the Directions given in the Answers to the Queries proposed by Sir *Archibald Grant*, p. 14, & *seqq.* Observe to sow the Rye thinner than ordinary, and give it only a little harrowing, that it may ly rough all Winter. If you find it so sandy that it cannot be left rough; in that Case sow the Rye above the Dung, plow it down with an ebb Fur, (which is termed *underfur Sowing*,) then sow the Clover and Rye-grass, and harrow them in gently with light Harrows. But in case you have not such a Store of Manure as will dress it all, you may continue gathering it till Spring, and let your Field ly cross-plowed all Winter, and until that Time; then harrow the Ground, carry out and spread your Manure, and sow Oats with the above Seeds at the End of *March* or Beginning of *April*, or Rye may be profitably sown even at this Season.

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Observe

Observe to make your Middings long-ways: If you please, take a Head-ridge of the same Field, the most conveniently placed, for the Purpose: Plow it as deep as can be two or three times, all in the cleaving way if the Ridge was high gathered, and harrow it well; then lay your slimy Clay about a Foot thick thereon, leaving on each Side a Part of the plowed Ground uncovered; next lay a thin *stratum* of Dung, another *stratum* of the Clay, and after that a *stratum* of burnt Lime in Shells at least a Foot thick; then throw up with Shovels the two Sides of the Ridge left uncovered; after that repeat another *stratum* of Clay, Wreck, and then Lime-shells as before, and the slimy Clay and Wreck, with any Earth, above all. The more of that slimy Clay, the better: For though, as you mention, it may be cold; yet, if it be, it will not be the worse for that sandy hot Ground. Besides, if you look well into the Clay, we doubt not but you will find it a very fat Substance, being, as we conjecture, mostly putrified Mussels and other Shells, mixed with Sand and Earth, which have brought it to be like unto the Consistence of Clay. The Reason for founding our Conjecture is, because here on this Coast we have found that slimy Substance to be nothing else; and, if so, it is certainly one of the best of Manures.

It is a Matter of no great Importance, though the foresaid Direction for making your Midding be not nicely in all Respects observed, if you only advert to interject Earth betwixt the Dung and the Lime; because Lime, if we mistake not, is of a corroding Nature; and, if we rightly understand it, the chief Service it does to Land is this, that it assists in the Fermentation of it; and that the more that it is of an attracting Nature, and a fit Recipient of the Nitre of the Air, contributing together to cut and divide the Earth into small and minute
Particles,

Particles, which are the chief Food of Plants: Dung does not want much Division, the principal Office of both is the same, *viz.* to divide and impregnate the Earth.

The greater Fermentation that can be given to Earth by the Use of either Dung or Lime, or by any Means whatsoever, and the greater Quantity of it that is fermented, so much the better; by reason that Fermentation, proportional to the Height of it, or burning with Judgment, strengthens all Salts, at least bringing them into less Compass, makes them more active; and the Middling directed will surely ferment highly, the Particulars of which it is to be compounded being of so heterogeneous Natures and Qualities.

After the Middling has stood six Weeks or two Months incorporating and fermenting, turn and mix it; and, to the End that this Work may be performed to the better Purpose, and with as moderate an Expence as possible, yoke your Plough, enter upon the Middling by a cleaving Fur, and continue, still repeating the Plowings the same Way, until the very Bottom of the Middling be ript up; then harrow it; it is impossible to overdo it: If it be very cloddy, it ought even to be harrowed amongst the Plowings, because the more Dust will be obtained by the Attrition. When, begin again in the gathering Way, that is, in the Middle, and plow over and over again in the same Way, until it be brought into as narrow Bounds, and be raised as high as possible. Then set Men to work with Shovels, or, for want of them, with Spades, and gather in all that the Plough left; which throw upon the Top, raising it as high as conveniently you can. Thereafter it may be raised into Heaps, like Pyramids or Sugar-loaves: For every Turning and Heaping occasions a new Ferment; and the more it is turned, and the larger and more compact

pack the Heaps are, the greater will the Fermentation be.

It would much increase the Fermentation, if the Seeds of Barley, or any other quick-growing Vegetable, were strinkled, or strewed thin, on the Middling, and the Plants, when fullest of Juice, and before coming to Seed, buried in it, by turning, or more heaping. This, which would only cost a Trifle, might be several Times repeated in the Course of a Season; and the Practice has been found successful. *

You

* This Matter should, notwithstanding what is said, be well considered, and the Question determined, Whether it is best to apply the Articles to the Field, after or before they are mixed and fermented? The Opinion of Writers, and Practice of Farmers, are generally for the first; but Mr. *Tull* says, That “ If
“ Dung be thoroughly ventilated and purified before it be spread
“ on the Field, (as I think all the Authors I have read direct),
“ so much of its Salts will be spent in fermenting the Dung itself,
“ that little of them will remain to ferment the Soil, and
“ the Farmer who might dung one Acre in twenty, by laying
“ on his Dung whilst fully replete with vigorous Salts, may (if
“ he follows these Writers Advice to a Nicety) be forced to
“ content himself with dunging one Acre in an Hundred.

“ This indeed is good Advice to Gardiners, for making their
“ Stuff more palatable and wholesome, but would ruin the
“ Farmer, who could have no more Dung than what he could
“ make on his arable Farm; for every Sort of Dung, the longer
“ Time it ferments without the Ground, the lesser Time it has
“ to ferment in it, and the weaker its Ferment will be.

“ The Reason given for this great Diminution of Dung, is,
“ that the Seeds of Weeds may be rotted, and lose their vegetative Faculty; but this I am certain of, by Demonstration,
“ that let a Dung-hill remain three Years unmoved, tho’ its
“ Bulk be vastly diminished in that Time, and its best Quality
“ lost, Charlock-seed will remain sound in it, and stock the
“ Land whereupon it is laid. For that Ferment, which is sufficient
“ to consume the Virtue of the stercorous Salts, is not
“ sufficient to destroy the vegetative Virtue of Charlock-seeds,
“ nor (I believe) of many other Sorts of Weeds.”

You are to repeat the above Method with the rest of the Outfield; and when it is done, do the like to the Infield, with this Exception only, that in the Infield you may sow the great Clover, instead of the small, with the Rye-grass; which may be cut for your own Use, or sold to the Town of *Montrose* in Grass or Hay: Upon the clay Part of the Infield, you are to lay less of the Clay, and more of the Dung, Sea-ware and Lime.

After these are finished, you may dismiss your Plough; and we are of Opinion, that a Dairy of about fifteen Cows might bring in good Profit; besides, you could buy every Spring Ews with Lamb, the Lambs to be sold, the Ews to be fattened, and disposed of before Winter. The Dung of these in Summer, with Winter-haining, will keep the Ground in good Heart. Yet, if you find any Parts thereof weak, you may still enrich them further by the foresaid Manures; to be laid on in *October*, that they may be washed in by the Winter-rains; or in *February* before the Grass begins to grow, as your Conveniency can best allow.

We are likewise of Opinion, that it would be profitable, after the Ground is laid down to Grass, to employ a Man, with a Horse, a Sledge, and a Cask or Barrel, perforated like a Sieve on the Bung-hole Side, and in the Months of *February*, *March* or *April*, to cause wet all the Ground fully with Sea-water, by turning down the perforated Side of the Barrel, that the Water may run out as the Horse goes along the dry Ground. This would both hasten and strengthen the Vegetation, and the Expence would be inconsiderable.

QUERIES by Sir GEORGE DUNBAR of Mochrum, concerning the Lands of Woodside.

SIR *George* has a Piece of Ground, called the *Easter Park*, of about fourteen Acres. It was in Grass twelve Years, and used for Pasture. It is now plowed, and this is the third Crop. It is a good strong Soil, and produces good Crops. He wants to lay down his Ground in heart for Hay.

Queritur, What Method shall he take for this Purpose, having no Dung to spare, but he can command Lime at a reasonable Rate, and coarse Clay to mix with it? This Ground lies pretty flat, low, and somewhat wet.

Item, *Duncan's Park*, next adjacent, of about seven Acres. It lies between two flat Meadow-grounds, both fertile; but the Situation of this Park is high, very dry, and the Earth is barren and stubborn. It has been in Grass these twelve Years. It bears neither good Corn nor good Grass, though the Meadows below are a rich Soil.

Queritur, What Method shall be taken to bring it to bear better Corn or Grass?

Item, *The Wester Park*, of about twenty-four Acres. It lies high, is a good Substance of Earth, inclining to Marl, at least to Clay, but spouty. It has likewise been in Pasture these twelve Years, and is so still. It is well tathed, but so entirely over-run with Rushes, that it bears little Grass to its Extent.

Queritur, What shall be done therewith?

Sir *George* can find his Accompt better in his Situation by Hay than Corn.

Queritur, Would it not be most expedient to lay down the high Ground with Clover and Rye-grass, and

and plow up his Meadows, which are somewhat fogged, and even to continue plowing them, and bestowing any Dung he has thereon, in regard the Hay thereof is soft, and not so good for Sale as the Hay of the high Grounds? Or shall he plow the high Grounds?

He has also *Ker's Park*, of about fifteen Acres, which lies low, and is Moss and Mire mixt with Sand, very boggy and wet, and full of Allar-bushes, Saughs, &c. He can lay it dry at no great Expence, having a Level: It is near to fine Clay.

Quæritur, What Method shall be taken to improve it?

The Society's Answers.

TO the *first*, The Ground being a good deep Soil, it is thought it will produce another good Crop, seeing it has been pastured these twelve Years. Then give it a Summer-fallow, by plowing it in *April*, or before the Middle of *May*. About the End of *June* let it be cross-plowed, as deep as possible, and have in readiness a Middling of different Kinds of Earth, Lime, and Dung if you can spare it, prepared and ordered according to the Directions given in the Answers to Mr. *Scot* of *Rossie's Queries*, p. 26. & *seqq.*

Observe to lay your Ground dry by such Methods as you shall think most convenient; and in case you incline to sow Wheat or Rye, harrow the Ground in the Beginning of *August*, lay and spread your Compost on it, then plow it in, and sow with the one or the other; if partly with both, give the Wheat the strongest Land; but sow neither of them so thick as ordinary, and give only a little harrowing. Immediately thereafter sow Grass-seeds, as directed in the Answers to Sir *Archibald Grant's Queries*, p. 14. & *seqq.* then harrow

row them in gently. If you incline to sow Barley or Oats, let your Field ly cross-plowed all Winter, and until the Spring; then harrow it, and carry out and spread your Manure; plow it down, and sow either Oats or Barley, as you please, with Grass-seeds as directed.

The Advantages of often plowing or fallowing of Ground, arise not only from the killing of Weeds, and making it more mellow and free, for the Pasture of the Roots of Corn or other Plants; but it is thereby also the better exposed to the Sun, and to receive the nitrous Particles of the Air, which help to cut and divide it into proper Morfels for their Food, at the same Time that they impregnate and enrich it for their Nourishment.

To the *second* Query, concerning *Duncan's Park*, That barren, stubborn, dead Earth, the more it is subdued, the more it is pulverised, and the better and the oftner it is exposed to receive the enlivening Influences of the Sun, Spirit of the Air, and Benefits of the Atmosphere; the more and better Food will be thereby prepared for Plants, the freer Access will the Roots have to it, and the better will they feed and be nourished. Wherefore, plow up this Field immediately after Barley-seed Time, if you cannot overtake it sooner; about the Beginning of *July* cross-plow it, as deep as you can; and let it ly so exposed to the Summer-rains, Dews and Sun, until the Beginning of *August*. Then harrow it compleatly; gather as many Clods, and Roots of Weeds and Grass, as you can, into moderate Heaps, lay dried Whins or any other combustible Matter underneath, set Fire to them in the driest Weather, and, when burnt, spread the Ashes carefully: Though the Clods burn not all down to Ashes, break them, and scatter them. You will find this Work very profitable, and observe a notable Effect: For, in proportion

tion to the Heat, the Ground will be divided and pulverised ; which this Soil chiefly wants ; its greatest Fault seeming to be, that few of its vegetive Particles are attainable by the Roots of the Plants, the stubborn Earth being impenetrable by them. These Things done, plow up the Land, water-fur it, and so let it ly exposed through the Winter to Frosts, Snows and Rains, to mellow it and make it fall.

In the mean time plow up, for Dung-hills, one or two Head ridges, as deep as possible, in the cleaving Way, if they were gathered before, and harrow well ; then lay on your Lime unflaked, or in Shells, and have Earth from the Meadow-ground or Ditches next to them, in readiness to cover the Lime, which will flake it, and occasion a greater Ferment, than if the Lime had been flaked before it was applied to the Earth. Then repeat a *stratum* of Lime and another of Earth, and Dung if you can get it, and so on until the Middling become of such a Height that it could not be plowed, if it was more raised. After you find your Lime flaked, and the Moss fermented, which may probably require six Weeks Time, yoke your Plough, cause first cleave out your Middling, then gather it in, and in all Respects order it as directed in the Answers to Mr. Scot of Rossie's Queries, P. 26. & *seqq.*

In the Spring, you are to harrow the Field with strong broad Harrows : You cannot over-harrow it, for the more Dust you can make, the better Effects will follow. After you have broke all the Clods as much as you can, gathered and burnt all the Wreck or Roots, and spread the Ashes, then carry out your Middings, and lay them plentifully on the Ground. After they are spread, sow Barley or Bear above the Manure, as by Experience you have found to agree best with the Nature of your Soil, and plow down with a light Fur ; then

E harrow

harrow gently ; or else give it such a Fur before you sow your Grain. We think the last Method the safest, since we are afraid that all the Contusion, and Attempts made to pulverise, will not have sufficiently answered the End proposed, and made it so fine as were to be desired, when under-fur Sowing is to be practised, considering how strong and stubborn this Soil, as you describe it, naturally is.

We believe it would be best to sow Grass-seeds with the Barley, while the Ground is as fine and mouldy as the Husbandry proposed could make it ; but if you chuse to take more Crops of Grain, let the second be Beans, or Pease and Beans mixed, and the third Oats, after two Furs, the first given before Winter : After they are sown, and somewhat harrowed, sow Rye-grass, and the yellow or white Clover, in such Quantities as before prescribed. But, in the first Field, in Place of either of these Clovers, sow the red Clover. If you incline to sow Winter-grain, you should do it in *August* ; when you may sow your Grass-seeds to near as good Advantage as in the Spring.

To the *third* Query, anent the *Wester Park*. The Rushes you complain of are an evident Proof that Draining is the first Thing, not only proper, but necessary : As it lies high, and so cannot be supposed to want a Level, you should take all imaginable Care to free it from the superfluous Moisture, which occasions the Rushes to thrive so well, and the Ground's producing but little Grass, which we are afraid is likewise of a bad Kind, as is too common in the like Cases. When you have drained it as much as you can, plow it up, take a Crop of Oats, and give it a Summer-fallow in Manner proposed for the first Field. Then take a Crop of Barley with Grass-seeds, as directed for the last. The Plowing for Oats, the Summer-fallow, the Husbandry for the Barley, and the catting of the Clover,

Clover, if you have not neglected the Draining, we persuade ourselves will have effectually destroyed the Rushes.

As to the *fourth*, respecting *Ker's Park*: The first Thing to be done is, to lay it perfectly dry, by Drains conveniently placed: Then grub up all the Roots of the Trees, Bramble, Brushwood, &c. and when it can bear Horses, pare with Spades or Plough, and burn it, as directed by Mr. *Maxwell* in his Essay on the Improvement of Moss, inserted P. 37, &c. You may plow up the Meadows if you please, and the whole may be profitably employed in Grain and Grass alternately, if these Directions be observed.

QUERIES for Colonel JOHN ERSKINE of Carnock.

THE Colonel designs to improve a Part of a Muir, consisting of some hundred Acres; intends to build a Steading of Houses fit for a Tenant; and to place Servants in it, with Cattle sufficient for a Plough.

Queritur, 1^{mo}, What should be the Form of a Sit-house, Barn, Byre, Stable, with Corn and Kitchen Yards?

2^{do}, What Number of Acres may this Plough manage, and after what Manner; Sea-fletch, Clay and Lime, being within a Mile and a Quarter of it?

Most of this Muir is pretty dry; the Heath strong; most of the Soil inclining to a reddish or yellow Clay and Sand, and a little of it is mossy: There are few Stones in it, except what the Plough throws up.

3^{tio}, What is to be done with a mossy Ground, that has been laboured, drained, inclosed with a Ditch and Dyke, and planted last Year, some Part
having

having been burnt, and a little Lime added? It bears good Oats this Year.

4th, How is this Ground to be managed next Year, or for two Years, in order to make it good Meadow?

The Society's Answers.

IN Answer to the *first* Query, concerning the Sit-house, &c. The Situation of the Place designed, the Inclination of the Master, the Expence he thinks proper to bestow; and, if the Ground is to be set to a Tenant; his Station, Circumstances and Occasions, ought to enter into the Consideration. Wherefore a particular Direction cannot well be given, unless these Matters were fully known.

To the *second*: A good Plough in ordinary Ground will till near fifty Acres in the common Way, but not much above thirty of this unbroken Muir, if Middings of Sea-sleech, Earth, Lime and Dung, be made and carried out by the same Men and Horses.

As to the subsequent Queries: The Goodness of the Oats you have on your mossy Ground, proves the Husbandry of burning and liming that Soil to be proper. In order to bring it to Meadow, when by the Plowings and Effects of these Manures, your Soil is pulverised, but before it be exhausted of its natural Strength, and the Effects of the Ashes and Lime, lay it down with Rye-grass and a Mixture of the Clovers. If you bestow upon it a Strinkling of any Dung, or of the Middling mentioned, the Advantage will be considerable.

We believe Manure of any Sort has the best Effect, when applied to Ground laid down to Grass as soon as possible after the Corns are cut: For then the Earth is most open to receive it, and so
it

it is in the less Danger of being washed away by the Rains, or its Virtues of being either dried up by the Wind, or exhaled by the Sun, &c. It comes then most seasonably to nourish the Grass-plants while young and tender: The better they are then fed, they will still thereafter be the more strong and vigorous, & *è contra*. The Country-man says, *Feed a Cow in the Calf-skin*.

If the Ground be pastured, their Supply must still be greater and greater, at the same Time that the Earth must grow richer and richer; because the sooner it be put into a Condition to maintain a good Number of Cattle, their Dung and Urine will the sooner enable it to bear a greater Number: The more that it is enriched, the hotter it will be, and the greater Suction it will make of the heavenly Influences, which will enrich it more and more.

The same Husbandry will be proper for every other Part of your Muir, where the Staple is so deep that it can reasonably lose a Part by paring and burning. Where it is not, give a compleat Summer-fallow, have ready prepared compost Middings of the Ingredients you mention, and apply them heartily to it.

ESSAY on Moss, and Grass from Grass-seeds sown. Written, at the Desire of the Society, by ROBERT MAXWELL of Arkland.

THE Nature, Qualities, and Methods of improving Moss, whereof there are so many vast Tracts in the Kingdom, never having been, so far as I know, treated of at length by any Author who has wrote on Husbandry, I, with Submission, offer my Thoughts on the Subject. I am not so
vain

vain as to think that what I can say will be considered of any great Importance; but perhaps it will, as I wish it may, induce some one or other, better qualified, to correct, and to make further Discoveries for the Good of the Publick; and then I attain what I aim at.

Moss is almost the only deep Soil, and perhaps the best of several whole Counties, were its Qualities well understood, though, at present, by the greatest Part, little valued; which makes the Knowledge of the proper Improvement of it the more necessary and useful.

The whole Mass and Body of it is a Dunghill, made up of rotten Timber, Grass, Weeds, and often Mud washed off from the higher Grounds about it, by the Land-floods; than which there are few richer Composts: Only, by Age, and its cold Situation in Water, pent in about it by the neighbouring rising Grounds, its Salts are weakened, and Spirits become languid.

The same will happen to the richest Middling that can be made of any Composition whatsoever, if too long kept; yea it will become such, as not to be distinguished from ordinary Moss by the Eye-sight, and no more useful as Dung than it, except either in Proportion to the shorter Time it has been kept, or the better Situation of the Place where it has stood.

I believe the Qualities of Mosses differ very little from one another in any other respect, than with regard to the Mud which makes a Part of their Composition, its being of a better or worse Quality, and as they happen to be in warmer or colder Countries, or more or less spongy, occasioned by the greater or lesser Quantity of Water stagnate in them: The more Water, the more spongy; the less Water, the more short and rotten; and the
rottenner,

rottenner, the fitter for the Vegetation of any thing that is planted in, or sown on them.

The spungy Moss grows indeed very well, and increases its own Quantity, but becomes the fitter for the Production of Plants, Roots or Herbs, by putting a Stop to its Growth. The most proper Method to effectuate which, is Draining.

From this it follows, that Draining is the first Improvement of Moss; and so necessary, that other Improvements cannot be made upon it, till that be executed; and, if well improved, it will produce and nourish Vegetables to equal Profit and Advantage, as perhaps any Sort or Kind of Soil.

I have seen upon it mighty Crops of Rape, Wheat, Barley, Oats and Pease; Parsnips, Carrots, Turnips and Potatoes; large and good Coles, and Herbs of various Kinds; most Sorts of Fruit-trees, thriving well, and good Bearers; and Forest trees of several Kinds; and it is good and convenient for Meadow, being (besides other Considerations) free of Stones.

If Moss, improven, be fit for so many good Purposes, it seems very material, to consider which are the most proper Methods of improving it. The best Way, in my Opinion, is, to pare off the Surface with Horses, and a Denshiring or Paring Plough; then to burn it, spread the Ashes, and plow them in with a light Fur, for a Crop of Rape, or such other Crop as the Master of the Ground is most disposed to have. But besides that the Rape is a valuable Crop in Consideration of the Seed, it gives this Encouragement also for the sowing of it, that the large bulky Stalks, on which the Seed grows, afford a fresh Supply of Salts when burnt; and, even while it is growing, the falling Leaves, for Want of Air to exhale their Moisture, become of a slimy, oily Substance, rot the Surface, and enrich

enrich the Earth by their Juices, Salts, and rotting upon it.

It is proper with the second Crop, at least with the third, to sow Clover and Rye-grass, or Seeds from Hay-lofts; for it is a prodigious Error, to over-crop Ground, before laying it down with Grass-seeds: But a third Crop, if the second show that the Ground is in Heart to yield it, is the more necessary on this Soil, (which is, as it were, stitched together) that Clover, or such small Seeds, require the Ground to be more pulverised, than one, or even two Plowings can, unless the Fog hath been wasted by burning, and that the Quantity of Ashes arising therefrom was considerable.

The more Ashes there are, unless the Quantity be extravagant, and more than ever I saw the Surface of any Moss yield, the better will the third Crop of Grain and the after Crops of Grass be; for they help much to cut and divide, and so to pulverise; which, with due Expositions to the Benefits of the heavenly Influences, is almost all that Moss wants, to make it fertile, if sufficiently drained.

This Grass ought to be mowed, not pastured, till the Surface become of sufficient Strength to bear Cattle. Thereafter it will not be improper, that it be mowed and pastured alternately, until the Master of the Ground incline to have more Crops of Rape or Grain. Then (in case either the Deepness of the Moss, or a Clay Bottom will allow of it) he may from Time to Time proceed in the foresaid Method, of burning, cropping, and laying down with Grass-seeds.

This however can only be done, after the Moss is become so firm that it can bear the labouring Cattle; which requires a good Level, and considerable Time to drain it; but that such a beneficial Improvement may not be retarded, the Moss,
if

if once tolerably dry, may be pared by an *English* Turf-spade, with which a Man will pare as much in one Day, as in a Day and a half, or perhaps two Days, with the ordinary Turf-spades of this Country; and the Turfs being burnt, the Ashes may be plowed in, by one Man with a Breast Plough, for four Shillings *per* Acre; for the Labour is not hard.

I humbly propose to those that don't incline to sow Rape, to plant Potatoes. It is observed, that the blue, or white Kidney Kind thrive best on this Soil; but any Sort will do well, and, if early planted, will be ready before the Frosts can endanger their rotting.

It is plain, that Denshiring is not only the most ordinary, but also the most proper Way to improve Moss; which for the most Part is either deep enough to bear it, or has Clay below; for the Fire revives the weakened Salts; or, as *Virgil* says,

*Whether from hence, the hollow Womb of Earth
Is warm'd with secret Strength for better Birth;
Or, when the latent Vice is cur'd by Fire,
Redundant Humours through the Pores expire;
Or that the Warmth distends the Chinks, and makes
New Breathings, whence new Nourishment she takes;
Or that the Heat the gaping Ground restrains,
New-knits the Surface, and new-strings the Veins.*

And if a Clay Bottom can be got at, the Mixture of the Clay, Moss and Ashes, makes one of the best of Moulds.

Perhaps an Objection may be raised by some against burning or denshiring of Moss, That, in dry Seasons, it is apt to overburn, or burn unequally, so that some Places may be pitted. To prevent which, (tho' I doubt if it would prevent it) they will probably suggest, that every alternate Ridge should only be pared.

This Theory, I am afraid, will give no great Satisfaction, when put in Practice. Nor do I see any great Danger in burning the whole Surface, where the Moss is of any considerable Deepness, even though it have a gravelly Bottom; and if it be Clay, the Hazard is so much the less: But though, to please the Objectors, I grant, that, in a dry Season, more of the Moss may sometimes happen to burn than is raised by the Plough or Spade, by which the Surface in some Places may become unequal; yet their Argument does not conclude with any Strength against paring off, and burning the whole Surface: For, I think, the Ashes of Moss, as they are lighter, so they are of less Value than the Ashes of Clay or some other Soils; and therefore their Deficiency in Quality ought to be made up in Quantity.

The Ashes that would arise from burning only the one half of the Surface, would, I am afraid, be very far from being sufficient to enliven, strengthen and enrich such a dead lifeless Body as Moss is, while it lyes unimproven; yea, the Ashes arising from the whole Surface will, as I apprehend, be all necessary at the least, to effectuate any valuable Improvement. Wherefore, if any Pits happen to be made, I am much disposed to think, that the Ashes found in them, when carried out and spread, will be of greater Consideration for the Improvement of the Moss, (or, if unnecessary for that Purpose, they will suit many others very well) than the Expence that can happen in making the Surface equal. Too many know, to their sad Experience, the bad Consequence of labouring any Soil out of Heart: The Charges of Seed and Labour are at least the same; so that the Expence of dunging and enriching of a Soil is hardly in any Case profitably saved.

Tho' I should grant the worst that can in any Event happen, which I believe never did, and probably

bably never will, that the whole Moss should burn, and that there should only be a gravelly Bottom below it; yet, considering of how little Value Mosses at present are, the very Crops that may be reasonably expected from a sufficient Quantity of Ashes, may without Extravagance be estimate at many Times the Value of the Property of the Moss as it lay before burning, even the Charges of Seed and Labour being deduced. Whatever Quantity is over, may be applied to other Purposes, as I have said, if the Possessor of the Moss has more Ground; if he has not, they may be sold at a high Price, it being known, that, if used with Judgment, they are profitable for dressing any Sort of Ground, whatever the Design be, in a superlative Degree.

To sum up this Head, I hope it is made pretty evident, that if Mosses be drained upon moderate Charges, and if, by the Burning, a Quantity of Ashes be obtained sufficient to enliven, strengthen and enrich them, there can no Danger arise from the Undertaking.

But the shortest Work of all for the Improvement of Moss, designed only for Grass, where the Situation gives Opportunity for it, is this: First drain the Moss: If there be Heath upon it, burn it off, and make the Surface equal. Then make a Dam at the lowest Part, and a Sluice, and work the Water upon it through the Winters. The Mud that comes by the Land-floods, will in two or three Years time bring a fine Swaird upon it, and thereafter be a yearly Dunging; so that it will bear annual cutting, and besides bring a good Foggage for Pasture, after the Swaird is become strong enough to bear Cattle. Or, where the Conveniency of Water for flooding cannot be got, if a Moss, after draining, be covered two or three Inches deep with other Earth, it will also bring a good sweet Grass upon it. Gravel has this Effect more than other Earth;

Earth ; because, being a weighty Body, of separate gross Parts, and of a hot Nature, it sinks into, incorporates with, heats, divides, and pulverises the Moss.

Dung, or Lime where it can be got, will also contribute to the Improvement of Moss, as well as any other Ground ; yea, there is this particular Encouragement for the dunging of it, that Dung will last, and do Service longer in Moss than in any other Soil whatsoever, which is owing to the preserving Quality of the Moss ; but whether Dung or Lime be used, the nicest Plowing is requisite, to keep them from sinking too deep into this light and open Soil.

Besides the Regard that ought to be had to Moss for its own Productions, it has this further to recommend it, that it is not only excellent Compost for Middings to be laid on Clay Soils, but also adds much to the Fruitfulness when laid on that Soil green ; which, perhaps, by some will only be imputed to the opening Quality of the Moss, separating the bound Particles of the Clay ; but it is known to have the Qualities and Effects of Dung upon light hazely Ground, not only when compounded with Dung, but also when laid upon the green Swaird.

A Gentleman renowned for Knowledge of Gardening and Agriculture * is in Practice, after taking two Crops of Oats from folded (or tathed) Ground, to lay on rotten Moss, double the Quantity of Stable or Byre Dung ; and he gets thereafter a Crop of Barley or Bear, and another of Oats, and lays down his Ground to Grass, notwithstanding, in good Heart ; which Crops his light weak Soil could not bear, were it not for the Benefit or Enrichment it receives from the Moss.

These

* Mr. Heron of Bargaly;

These being the most material Thoughts, that presently occur to me on this Subject, which, so far as I know, has never been treated of at length by any Author, I humbly leave it to the Honourable Society, to judge how far they are just, being desirous to be corrected, and to see a Subject so very important better handled.

When I commenced Farmer, I did not only consider what Crops, or in what Shape the Ground I possessed would bring most Money into my Pocket in shortest Time, but I also employed my Thoughts upon the Consideration of the better or worse State my Ground would be improv'd or reduced into by these Crops, which is certainly a most necessary Part of Discretion to be regarded by all in my Situation, where Dung cannot be had for Money, at least without an extravagant Charge of Carriage; for it is certain, that of the different Kinds or Species, both of Grains and Grasses, some meliorate and others deteriorate the Soil; and as I observed the Humour of the Neighbourhood running upon Tillage, I judged that I might therefore reasonably expect to make the greatest Account, by laying down a considerable Part of my Farm with Grass-seeds for a Crop of Hay and Foggage; and Hay is less subject to the Embezzlements of Servants, than Grain.

Clover and Rye-grass mixed bring a greater Burden of Grass for Hay, than Clover by itself, and is more valuable in the Opinion of the Merchant, and even in some Cases, for home Consumpt: Yet, upon Observation, as well as a rational Consideration of the Matter, being persuaded that Rye-grass wasted, and also occasioned the Ground to be grassy after being labour'd for Grain; and that Clover not only enriched it, but also contributed considerably to the Destruction of Weeds, I determin'd to sow Clover
alone,

alone, at least with a very small Proportion of Rye Grass; but I think I have been led into an Error as to the Quantity of Clover-seed to be sown on an Acre of Ground, by the Authors who have wrote on that Part of Husbandry; some directing to sow twenty Pounds upon an Acre, some sixteen; none, as I have observed, less than ten or twelve, (besides the Seeds of Rye-grass) when sown in the common Way. The greatest Part of them say, that the more Seed is sown, the better Crop is to be expected; and that what is saved in the Seed, is lost in the Crop: Whereas I flatter myself I am able to demonstrate, that five or six Pounds are sufficient, or rather more than is necessary. The Method I take to do it is this:

In one Acre *English*, (let about a fifth more Seed be added if the Measure be *Scots*) there is 160 square Perches, at $16\frac{1}{2}$ Feet to the Perch; and in five Pounds there is 160 Half-ounces, which is eight Drop-weight to the Perch; and in eight Drop-weight of Clover-seed, if well chosen, there will be found to be (after a Trial made by Water) about 8000 good Seeds; which, if regularly sown, may produce at least 7000 Plants; whereas one square Perch cannot contain above 1156 Plants at six Inches equal Distance; and I think I am able to maintain, that Plants of Clover are sufficiently near other at six Inches Distance, considering how many Stems each Root sends forth, when standing at due Distances; but to avoid all Danger, I allow 7000 Plants instead of the 1156, which seem to me to be sufficient. Wherefore I would ask, what comes of all the Plants that arise from twenty Pounds sown on an Acre? if the Answer did not appear plain, That they rob and starve one another; and surely, those that are not killed by Want of Food, are still dwarfish, and of very little Value, in comparison with what they would be, if there was
more

more Space of Ground betwixt them: Just as it happens, when the Sower of Corns loses some Handfuls by an Accident about the Sack or elsewhere, which falling thicker than reasonable, the Produce of the lost Corn is of small Value, both with respect to the Ears and Straw, when all around sown at due Distances makes a valuable Crop in both Respects.

This Theory I have proved by Practice; for I have this Season cut Clover sown with twenty Pounds to the Acre, and with five Pounds to the Acre; and that sown with the five Pounds produced the strongest and best Crop, tho' the Ground on which both grew was in equal good Heart, the same Soil, and got the same Preparation.

I am so satisfied of the Certainty of this Position, that, could I rely upon the Dexterity of the Sower, I would never give so great a Quantity as even five Pounds to the Acre.

A worthy Member of our Society *, upon my mentioning this Method to him, last Year, has also made the Experiment; and will bear witness that it answers to Satisfaction. So, since four Acres can be sown for the former Charge of sowing one, it is reasonable to expect some more will follow my Example; but such is the Force of Prepossession in an Opinion, and of Custom even where it is shown by solid Arguments to be unprofitable, yea disadvantageous, that possibly the greatest Part of those who shall hear my Reasoning, will either contradict my Opinion, or remain quietly unconvinced, and continue in the Faith of (in my Way of thinking) a very dangerous Principle, That the more Seed be sown, the better Crop is to be expected. As to whom, I shall take no more Care, than first to advise them, if they please, to make

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* Sir John Dalrymple of Goulland.

a Trial, (because, by the same Rule, and for the same Reasons, a Proportion of all such other Seeds as are in use to be sown in unreasonable Quantities may be saved,) and to be careful, that the Clover-seed be regularly disposed, and gently harrowed, or rolled into the Ground; and then, if they don't find their Account by following my Method, let them return to their own; but, for Vindication and Support of my Opinion in this Matter, I incline to mention an Experiment made by the ingenious Mr. *Tull*, in a similar Case, in his own Words.

“ This last Summer, *says he*, I saw the Produce
 “ of two St. Foin Plants carefully weighed. They
 “ both grew on the same Ground, not far asunder,
 “ and of the same Age, *viz.* seven Years.
 “ The one stood single; and its Produce weighed
 “ thirty seven Ounces and a half. The other
 “ grew in a Bunch among many Neighbours, and
 “ was dug up; and its Produce, cut close to the
 “ Root, weighed three Grains: Which is about a
 “ five thousandth Part of the other. I think this
 “ proves that it is not extravagant to say, one
 “ single or thin St. Foin Plant, may produce as
 “ much Grass or Hay as a Thousand thick ones;
 “ and I have seen much greater single St. Foin
 “ Plants than this.”

To mention, that the Ground that Clover-seeds are to be sown upon, ought to be as much freed of Weeds as possible, and made as rich and fine as for Barley; and that therefore it is more proper to sow them with Barley than Oats, unless the Ground where the Oats are sown be equally well prepared, which is not ordinary, seems not very needful, there being Directions given concerning these Matters in several Books of Husbandry. But I incline to take notice of one Hazard attending Clover-seeds sown in very dry hot Weather, to wit,
 That

That they being very small Seeds, and only covered, if as they ought to be, very gently, they are apt to be scorched and killed. To prevent which as much as possible, I advise to steep the Seeds, and to dry them with Chalk finely powdered; which also assists to the sowing of them more equally, the Whitening making them the more easy to be discerned.

Now, I flatter myself I have made it evident, that five Pounds of Clover-seed to an Acre is a more reasonable Proportion than twenty, and that it is hurtful to the Crop to sow such Quantities of it as is usual. The same Reasoning will hold as to most Sorts of Seeds. Those that do not observe it in the Case of Turnips, when too thick sown, and the Hoeing neglected, are blind because they won't see.

What I have said, is chiefly intended where the Design is for Hay; for where the Ground is constantly pastured, and the Grass kept short, so numerous Stems do not arise from one Root, and overspread the Intervals: Therefore, where this is the Intention, a greater Quantity of Seed, in Proportion, ought to be allowed; but too few trouble themselves to think, and make such necessary Distinctions.

If my Reasons are convincing, as I think they are, I hope I will be excused, by the Writers on Husbandry, who allow such great Quantities, and without any Distinction; especially those who maintain, that the more Seeds are sown, the better Crop is to be expected.

Since I wrote this Essay, I have observed, that Mr. Tull, in what he calls *Remarks on Virgil's bad Husbandry*, has censured that Author wrongously, for the Opinion delivered in the Passage I have quoted. But I need not trouble myself with

that Matter, since, in his *Supplement*, he has retracted, and acknowledges, that when he wrote his Book, he had not heard of burning any other Sort of Land, except poor, thin, hollow Downs, which surely Moss is not, but can well bear a Diminution of some small Proportion of the Staple, for improving of the remaining Part; yea, several Mosses are so deep, that they can reasonably admit of successive Parings and Burnings when Occasion requires, as I have said. Past all doubt, the Practice is in that Case most commendable; for every Body knows, who has made Trials, or even Observations, how beneficial it is; and Mr. *Tull* himself has been forced to own, even in these his *Remarks*, that “ he knows nothing, yet discovered, “ that will cause the Ground bring so good Crops, “ or equal the Benefit of Ashes.”

MEMORIAL, wrote by Mr. Maxwell, and presented to the Duke of Queensberry and Dover, relating to the Improvement of his Grace's Mosses upon Locher Water. Communicated to, and approved of by the Society.

THE Memorialist, having viewed the great Moss of *Locher*, at the Desire of the Honourable *Patrick Boyle*, one of your Grace's Commissioners, humbly conceives, that there is not a better Way to come at the understanding of any Thing, than to endeavour to trace it through the various Vicissitudes that may have happened to it, and to consider the Causes and Occasions of these Alterations, with the consequential Effects thereof; that so, by taking the Matter under so extensive a View, there may be the fairer Opportunity to judge, what may be the Nature of the Subject under

der Consideration, and what proper Use and Improvement may be made of it.

This Moss of *Locher* is about ten Miles in Length, running from *Locher* Bridge South to *Solway* Frith; and, being of a considerable Breadth, contains several Thousands of Acres. 'Tis obvious, from the Appearance of the Banks at *Burnt-skirth*, and other Places near the Head of it, that they have been occasioned by the tossing of Waves; and from the Sletch or Sea-sand in many Places found under the Moss, that the Sea hath once overflowed all this great Valley. This Sea-sletch, having lain so long rotting under the Moss, and receiving what subsides therefrom, must now be very rich in its Qualities; since it suffers no Waste by Exhalation, or the Production of any Vegetable. It is also plain, from the many large Trunks of Trees, still unconsumed, that this large Tract hath thereafter been covered with Wood.

Though these Observations may appear, by what follows, to be material; yet, as it seems foreign to the present Purpose, to inquire into the Causes of such Changes, the Memorialist shall content himself with endeavouring to show some of their Effects, and what Causes have concurred, to bring about such another remarkable Change, as that this Valley, which appears to have been once Sea, and thereafter a Wood, should be now covered with such a deep Moss.

That vast Numbers of Trees have been once there, is evident, as observed, so many remaining to this very Hour: Whatever might be the Occasion of their Fall, which the Curious may inquire into; the Effect of their lying there, must necessarily have been, to occasion a Stagnation of the Water falling down from the higher Grounds at the Head, or issuing from a Ridge of Hills on each Side; so the Earth, Dirt and Sullige, conveyed by
the

the Water, must have remained among the fallen Wood ; and such a Stagnation is the very Mother of Moss, at least of this Moss, which is no original Soil, but occasioned by such Causes which have produced it as their Effect. Under this Moss, so situated, and so occasioned, it is more than probable, that, upon proper Trials, and even by the Draining, great Quantities of Shell-marl may be discovered, large Quantities thereof, of the very best Sort, being found within a few Miles of it, in Places far less likely.

These Things being premised, it may be observed, That Moss is occasioned by a Stagnation of Water among fallen Timber, Dirt and Sullige, which, by Degrees, become a Morass so impassable, that Cattle have only Access to feed upon it in very dry Seasons, (and indeed they do not chuse such Grass, except in the Months of *April, May* or *June* :) That the Grass and Weeds which Cattle do not eat, after shaking their Seeds, fall and rot : That new Plants grow every Year from these Seeds, which, in like Manner, after shaking their Seeds, fall and rot ; whereby an annual Addition is made to the Deepness ; and that the Water being pent up, it must of Necessity swell the Morass more and more: From which it appears evident, that Moss is a Dunghill, made up of excellent Materials; but as their Salts have lost their Savour, and become languid, by the perpetual Stagnation of Water ; so it is plain, that, until the Cause of their Inactivity be removed by sufficient Draining, and till they be enlivened and invigorated by proper Expedients, Moss is a very barren Soil ; and, on the contrary, that proper Methods being taken to enliven them, and pulverise the Soil, (which is very practicable, the Moss being once sufficiently drained) such a Substance, made up of such
excellent

excellent Ingredients, must, in the highest Degree, be proper for the Nourishment of Plants.

It is certain, that the greatest Part of this very Moss of *Locher*, if once sufficiently drained, might, on a very reasonable Expence, be made as profitable Ground as perhaps any that can be found in either of the Counties of *Nithsdale* and *Annandale*, which it divides; and it is far from being impossible to drain all your Grace's Property of it, if the Lord *Maxwell's* Mill was removed; for the Dam of this Mill, together with the Narrowness of several of the Passages of the Water above the Dam, swells it back.

Were this Mill and Dam removed to some other Place, the greatest Difficulty would cease, and the Fall of *Locher* Water could even be made as much greater than what it is, as would more than sufficiently answer all the End; for the Memorialist, upon a Trial, has found, that the Top of the Dam is about nine Feet higher than the Fall at the Foot of the Stream below the Bridge; and that, by collecting the Water that falls down from *Moufwall* Side into the Moss, at a very convenient Place above *Horseholm* House, and carrying it by a Canal to a Runner of Water that passes under a Bridge into *Locher*, a little below the *Stankhouse*, where there is a very proper Station for a new Mill, and where it cannot be troubled with Back-water, occasioned by Tides or Floods, there may be about fifteen Feet of a Fall obtained, and a Sufficiency of Water provided for the Mill, even in the driest Seasons; and by thus diverting the Water that comes from *Moufwall* Side of the Moss from falling into *Locher*, the swelling of *Locher* would be so far prevented.

Besides, if the Course of *Locher* Water was widened and deepened, it would contain a greater Quantity of Water than at present, which, in that Case, would

would run off more freely ; and the Ditches from *Locher* up through the Mosses, in order to the draining of them, will also contribute to prevent the Overflow, in Proportion to the Quantity of Water they may be able to contain. All which being considered, it seems evident, that all Inconveniences from *Locher* Water may, by some of these Means, be prevented or remedied ; and in that Case it is certain, that all your Grace's several Parts of this great Moss of *Locher* may be improved to the greatest Height ; for the Deepness of the Moss is no reasonable Objection.

In some Cases a considerable Deepness is rather convenient and profitable ; especially where, upon proper Trials, it may be found, that the *stratum* under the Moss, is of a Substance less valuable or improveable than the Moss itself ; in which Case it would be imprudent to waste the Moss needlessly : Where-ever the Earth lying next under the Moss (which the Memorialist, upon Trials, has found in several Places to be very rich) is more valuable and improveable than the Moss itself, in that Case the Moss may, in different Ways, and after different Preparations, be used as a Manure, and applied to very profitable Purposes.

The Families of *Nithsdale* and *Stormont*, Sir *William Grierson*, Mr. *Areskine* of *Tinwall*, Mr. *Corson* of *Meikleknock*, Mr. *Maxwell* of *Carnsalloch*, and some others, have Parts of this great Moss ; but your Grace is by far the greatest Proprietor of it, especially since your late Purchase of the Estate of *Craigs* : For, on the *Nithsdale* Side of the Water of *Locher*, you have a very large Tract of it, as a Part of this new Purchase, even for some Miles in Length, stretching all the Way from near *Carlawerock* Kirk, to the Mosses belonging to Mr. *Areskine* of *Tinwall*, the Town of *Dumfries*, and Mr. *Corson* of *Meikleknock* ; and, on the *Annandale* Side,
you

you have still a larger Tract of it, as a Part of the Barony of *Mousewall*, bounded by the Lords *Stormont* and *Maxwell's* Lands on the South, *Locher* on the West, Sir *William Grierson's* Lands of *Horseholms* or *Grains* on the North, and the dry Lands of your Grace's own Barony of *Mousewall* on the East. Besides, your Grace has still more of this great Moss, as a Part of the Barony of *Torthorwall*, lying along *Locher* Side, and bounded by Sir *William Grierson's* Property on the South, and Mr. *Areskine's* on the North.

Surely it would, particularly, be the Interest of the Lord *Maxwell*, Sir *William Grierson*. and Mr. *Areskine*, not only to concur with your Grace in the Charges of making the Canal mentioned, and removing the Lord *Maxwell's* Mill, which would be but a small Matter among so many, and would make the Improvement of their Mosses, as well as your Grace's, very practicable; but also, of dividing your Grace's Property from theirs, by Ditches, which would so far serve as Drains.

To describe and show pointedly and distinctly how all your Grace's several Parts of this great Moss may be first drained and then improved, would swell this Memorial excessively; besides, it seems the far less needful here, since the Memorialist, some Time ago, wrote an Essay, at the Desire of the Honourable Society for improving in the Knowledge of Agriculture, on the Nature, Qualities, and several Methods of improving Moss; which, so far as he knows, was universally approved of.

The Memorialist shall only beg Leave to suggest, that as your Grace's Lands lying contiguous to the Mosses of *Mousewall* and *Craigs* are all or mostly out of Tack, so, if you are pleased to undertake an Improvement of them, now when the Opportunity offers, and may be lost if the Lands
whereof

whereof they are a Part be rashly set, it is possible, by cutting them off from the Lands adjoining, which would make but a small Diminution of the Rental, that your Grace may, on very moderate Charges, if you engage a Servant sufficiently qualified to carry on the Works, (upon which the Success of the Design depends) make two considerable Estates, the one out of the Moss of *Moufwall*, and the other out of the Moss of *Craigs*.

If your Grace take Thought of this Matter, the Memorialist will be very ambitious to offer a frugal Scheme, by which you may lay out Money more profitably than though you could buy Land fully improven under seven Years Purchase.

The Memorialist, unwilling to offer any indiscreet Trouble, shall conclude with observing, in the first Place, that, in his humble Opinion, nothing less than a general Improvement of at least one of these Mosses can turn to any considerable Account; because the first regular Step that can be made, is to make a surrounding Ditch of a sufficient Deepness, that so no Water may enter the Mosses from the higher Grounds of either *Moufwall* or *Craigs*; for the Water falling down from thence, first contributed to make, and still continues to confound and spoil the whole Mosses; which this Ditch, if it be wide and deep enough, will not only prevent, but also help to drain them.

Though this was done, there is another Thing still as indispensable; and that is, to make as many principal Drains, quite through the Mosses, as may be necessary, of a sufficient Wideness, and of a Deepness below the very Bottom of the Moss: For until every Drop of the very Heart's Blood, as it were, be let out of it, it will never give over growing, such is the vegetative Nature of it; and while it does grow, let any Improvement
whatsoever

whatsoever be endeavoured, nothing else will grow, except a coarse watry Grass, or some aquatick Plants.

The Incisions must be made, where-ever they may be necessary, from the lowest Part, quite up through to the very Head of the Moss, to let out the whole Corruption or Purulency; for Moss is so open, and communicative, that, as a Sponge, the Water disperses itself through, and rises up in it: Which being observed and admitted, it is evident, that though main Drains were made sufficiently wide and deep, for a Part of the Way, in order to the Improvement of a Part; yet that Part can never be improv'd to such a Degree, but it will be of a boggy Nature; and so any such Improvement will prove insignificant, comparatively with what it would be if the main Drains went quite through the Mosses.

If this be the Case, as it is humbly thought it would certainly happen, then it follows, that, in order to execute any reasonable Improvement, these main Drains quite through the Mosses are indispensably necessary, as well as Ditches surrounding the whole; and few Tenants will be at the Charge of doing both to purpose.

Some indeed may propose to make small Improvements on Parts of these Mosses, and may perhaps have the Hardiness to attempt it; but then they'll discover the Truth of what is observed; and all they can do will be so insignificant, for the Reasons given, that it will scarcely deserve the Name of an Improvement, but will rather tend, by the Disorder and Confusion it will make, to obstruct a general and a regular one, upon a Subject the best deserving of any the Memorialist has observed in the Kingdom.*

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Past

* Though my Sentiments in the four last Paragraphs are, by many of the Readers of them in *The Transactions of the Society*,

Past all doubt, a prudently designed and well conducted Improvement on these Mosses, carried on with Spirit, would turn to vast Account : For, besides what has been already taken notice of, its Situation is adjoining to the Sea, in a Place of Consumption, under a warm Sun, in the most southerly Part of the Kingdom, having a Ridge of high Ground on the East, and on the West, not only reflecting the Heat of the South Sun upon it, but also breaking the Clouds of salt Vapour attracted by the Sun from the Sea, also on the South, to which the whole Moss lies well exposed, which therefore fall upon it, and will impregnate and enrich the Soil when drained and improven ; these, my Lord, are Advantages the Moss of *Locher* hath : So, joining all Circumstances, no other Moss in the Kingdom of any considerable Extent hath so many Encouragements and Conveniences for Improvement ; for, as it can be drained so far as your Grace's Property reaches, so a great Part of it (after being improven, by which it will greatly subside and fall) may be

Society, maintained to be just ; yet I own that I have, since I observed Mr. *Græme* of *Ardgomrie's* Husbandry in *Perth* and *Stirling* Shires, which shall be particularly after mentioned, and read the Letters in the *Dublin* Essays on the Cultivation of Moss, which shall be herein afterwards insert, changed my own Thoughts so far, that I am now satisfied, that the Success of the Improvement of it may be more endangered by draining it too much, than too little ; for I saw that Mr. *Græme's* Crops were best, where the Surface of the Water, in the Ditches, and upon the very Moss, was not above three Feet lower than the Top of it, where they grew ; and that where the Surface of the Water was lower, they grew worse. Mr. *Græme* and his Servants told me, that this always happened. I was very observant and inquisitive, being sensible that this Discovery gives great Encouragement to the Improvement of Moss, seeing it is proved, by many Experiments, that Moss, though it cannot carry Cattle, can be properly plowed for Corn by one Man, and without Horse or Ox, the Labour being easy to the Man.

be flooded, and the Water wrought upon it at a small Expence ; the Benefit of which is universally known.

Moreover, the Ditch that will be necessary for cutting the dry Lands of the Estate of *Craigs* from the Moss, may be so contrived, and the Water falling into it so managed, that all, or at least the greatest Part of the Ditches that may be necessary for draining the Moss, may be thereby scoured and kept clean without Expence : The very Burn of *Moufewall*, which presently runs on the North-side of that Moss, overflows and does vast Damage to *Moufewall* Meadows, and to the arable Land, Meadows and Bog of *Horseholm*, all of them your Grace's Property, may on a very small Charge, be carried along either the South-side of that Moss, or through the principal or other Drains thereof ; or it may be allowed to take its usual Course, to benefit these Meadows, by overflowing them at proper Seasons : As it is sometimes past riding, and falling down from high Grounds, runs with Force, that Management must certainly have the Effect to wash all the Ditches into which it may be cast. Thus it is evident, that the Damages that may be avoided, and the Advantages that may be obtained, by a prudent Government of the Water, must both be very considerable.

Your Grace's Property in *Locher* Moss, as a Part of the Barony of *Torthorwall*, is also not only very extensive, but in proportion to the Extent of it, the most valuable Part of the whole Moss, and capable of being improv'd to the greatest Height on the smallest Expence. So great is the Damage that *Locher* does on this very Part of the Moss, that the Tenants of the Farm of *Roucan* insist upon it, that in the Year 1739 they lost more than 50 *l.* Sterling by the Overflow of that Water at improper Seasons.

More

More Observations apparently useful, might be made with respect to these Mosses, which it is thought are of three or four Thousand Acres Extent; but the Paper being already swelled, the Memorialist dares not presume further on your Grace's Time: However, what is here overlooked may be taken notice of in Conversation, if it please your Grace to give an Opportunity.

The greatest Effort, in *Scotland*, to improve Moss, was made since the Publication of my foregoing Essay, by Mr *Græme* of *Ardgomrie*. His Operations gave Occasion to much Speculation, and induced the Justices of the Peace of the County of *Stirling*, to appoint a Committee for visiting his Mosses, and examining his Method of improving them.

REPORT of the COMMITTEE.

AS the Gentlemen, named by the Quarter Session, were very willing to accept of the Task appointed them, from a View of doing Service to the Country; so they now, with equal Pleasure, give in their Report, as they hope it will be of Use to engage others to follow the laudable Example set them by Mr. *Græme*; and as they have now an Opportunity of doing Justice to Mr. *Græme*'s Attempt to cultivate these barren Fields, who may well be considered, as one of the most useful Farmers that ever settled in this Part of *Scotland*.

We are very well apprised, That what we are about to say of these Fields, may shock vulgar Prejudices, and appear romantick to those who never examined Mr. *Græme*'s Husbandry, with the Care and Attention we have done. Many Examples may be given of the most beneficial Inventions ridiculed in their Infancy; which after repeated

peated Trials, and Length of Time removing these Clouds, have been found of the greatest Utility to Mankind: But Truth, however obscured and damped at first, will always remain Truth; and the more Pains Men bestow in finding it, the greater Pleasure will result from the valuable Acquisition.

Certain it is, That the uncouth Aspect of these Fields, which our Forefathers have, for so many Ages, considered as absolutely useless and barren, must naturally revolt a cursory Inspector, and send him away with a very unfavourable Opinion, both of the Soil, and the Attempts to cultivate it. Nothing, at first Sight, can appear more ridiculous than an Effort to raise Grain, in the Middle of Heather, standing upon a Moss fifteen Feet deep. We are very sure, that others must consider it as impossible, because it appeared in the same View to ourselves, until, by repeated Inspection and accurate Examination, we began to be sensible that the Thing was practicable; but when Mr. *Græme* advanced in his Improvements, the Conviction of the Truths we now offer to the Publick, overcame our Prejudices, and fully convinced us, that Moss-farming must turn out to Advantage, by the most cogent of all Arguments, ocular Demonstration.

Last Season we were shown upon the Moss many Fields of as good Grain as any in the County. This appeared the more extraordinary, as it is well known, that Mr. *Græme* began and carried on his Method of Agriculture, through a Series of as bad Seasons as ever were known in *Scotland*. We are of Opinion, that the Barley we saw, even upon the worst Soils in the Moss, would weigh against most Barley in the Country. His common rough Bear was inferior to none, and the Flax and Potatoes appeared exceeding good in their several Kinds.

Such

Such was the Appearance of his Fields last Year ; but this Season he has reduced many more Fields to carry Grain, and can now show Wheat, Oats, Pease and Beans. The Wheat appears thin in many Places, but no Body will wonder at this, who knows, that the best Wheat Fields in *Scotland* have failed this Season by the Violence of the Spring Frosts, a Misfortune which affected Mr. *Græme* in common with his Brother-Farmers: But we can truly say, that the Wheat still remaining, has the Stalk abundantly strong, and the Head or Ear, of the usual Size of that Grain.

His Oats are as good, if not better, than any we have seen this Season on any Soil. The Barley and Bear appear not so promising, occasioned by some obvious Mistakes, one of which we shall mention, *viz.* the sowing of the Barley late in the Season, and with a single ploughing. Hence the Grass and Weeds not being destroyed by more frequent Tillage, over-ran the Grain. Though this is now found to be bad Husbandry on the Moss, as well as on other Soils; yet we do not look upon this as any bad Symptom of mossy Soils, that by earthing them, runs so fast to Grass, as we are sure that many Gentlemen would be heartily glad to see all the mossy Vallies, on their Estates, covered by the same Grass that destroyed Mr. *Græme's* Barley. Nay, we are glad to take notice of this Accident, as a corroborating Proof of what we have seen on this Moss; that where it has been earthed two Years ago, but not sown, it is now as full of natural white Clover, and other Grass, as any Field generally is in twice that Time. Hence we are of Opinion, that the Moss would, when well earthed, (which, in Mr. *Græme's* Way, is performed at an easy Expence) hold out a long Time in good Grass, without sowing, or Danger of Heather springing in it, because the Soil, by the first
Earthing

Earthing and Tillage, is changed from its original Quality. The Earthing is certainly the principal Article of the Moss-Husbandry, as it thickens and changes the Soil: The Ashes give it Fertility: The Tillage, raising the Ridges to a proper Height, leaves it dry; and thus it becomes one of the best Soils for good Pasture, which is a black loamy Soil, with a mossy Bottom.

We have already mentioned the Flax and Potatoes we saw last Year. These were sown and planted by Mr. *Græme*. This Season we inspected several Lands Flax on the Moss, laboured by Country People, Mr. *Græme's* Tenants. It is not to be expected, that Country People, who are but just initiated in the new Husbandry, will do as well as Mr. *Græme*; but this has not hindered even their Flax-Crops from being tolerably good; and it may be justly expected, that their future Crops will increase in Value, in Proportion to the Advancement they make in their Knowledge of this Method of Culture: For our own Parts, we are unanimously of Opinion, that no Soil around it will give better Crops of Potatoes and Flax, than the Moss will do, when properly dressed according to Mr. *Græme's* Method.

This Season also, in our late Visitations of these Fields, has afforded us a very agreeable Surprise from the Appearance of a Crop we always wished, but never hoped to find on these Lands. Mr. *Græme* showed us a Crop of Pease and Beans, rather stronger and better than any we have seen this Season, either in the *Kerse* or dry Fields; we indeed imagined formerly, that it might grow Pease, though not Beans; but now, by inspecting this Crop, we are convinced, that though it be already very good, yet it would have been still richer, had a greater Number of Beans been mingled with the Pease, as the latter by their prodigious Growth, are apt to fall down by their Weight, for Want of
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the friendly Support and Assistance of more Beans. We are now in no Doubt, that the Beans would be a favourable Crop, as those few, which we saw amongst the Pease, are increased to a surprising Magnitude. The great Plenty of Pods which now load this Crop, assures us, that they will appear upon the Barn-floor, at Harvest-home, to as great Advantage as they now do in the Field: We are therefore of Opinion, that a Soil which now affords such Heads of Wheat, such Pease and Beans, may, by proper Culture, produce any Thing else this Climate yields, and with a very moderate Expence.

This naturally brings us to consider the Charge of the Husbandry practised on this new Soil. When we first saw Mr. *Græme's* Works, and his Set of Utensils, intirely different from those commonly in Use; we imagined, that any Thing so uncommon, must be very expensive. But now, on a narrower Enquiry, and by frequent Conversations with Mr. *Græme* and his Workmen, we are well assured, that his Method of Husbandry is the cheapest, and his Fields more easily laboured, than any in this Country. The Detail of his Utensils, and the Methods of using them, are foreign to our present Purpose, and may be better learned on the Spot, than from any Thing we can say of them.

In order to convince this Meeting, that the Committee were not willing to take any Thing on Trust, we were not satisfied even with Mr. *Græme's* Account of his Expence and Method of Husbandry, much less with that of his Workmen. The Committee therefore determined to examine some of the most understanding Farmers in that Neighbourhood, and who had been present ever since Mr. *Græme* first broke Ground on these Fields, not in a cursory Manner, but upon Oath, with relation to the Truth of Mr. *Græme's* Plan
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of Culture, and the Advantages he pretended resulted from his Methods of Husbandry.

For this Purpose we took the printed Memorial relating to the Moss-Culture, bearing Date the 8th of *March* last, herewith produced, and after solemnly taking their Oaths before two Justices of the Peace; they all unanimously deponed, That the said Memotial contained, in most Things, their own Opinion concerning the Moss-husbandry, particularly in relation to the four last Positions advanced in that Memorial, which are indeed the principal and most valuable Parts of the whole, *viz.*

1^{mo}, That the Moss could be brought to carry good Barley, or any other Grain, with less Expence than the Outfields, either of *Kerse* or dry Field.

2^{do}, That it can be kept in Tillage cheaper than any of these Soils, and yield as good Grain of all Kinds.

3^{tio}, That any Countryman can labour a Farm of Moss with less than Half the Stocking necessary for any other Farm, with less Hazard of failing, and have as good a Return.

4^{to}, That when it is properly cultivated, the Moss will stand wet and dry Seasons, better than any Soil around it.

Such were the Opinions delivered to us by the neighbouring Farmers, as will appear from the printed Memorial signed by the two Justices of the Peace, before whom the Affidavits were made, and their own Subscriptions to their Oaths herewith presented to the Court.

We can easily observe, that these Mosses improve every Year by Tith, and the small Addition of Earth which they receive, the Expence of which is very inconsiderable. The only Improvement we could propose at present, is, that the Moss, for

a second Crop, should have two Plowings, in order to kill the luxuriant Growth of Grass and Weeds which arise from the Earthing, unless the Field is sown before the Middle of *March*.

It may be proper, in the Conclusion of this Report, to make a few general Observations on the Utility of, and Advantages that must follow from this Cultivation of Moss after Mr. *Græme's* Plan. We are humbly of Opinion, that these must be very considerable to *North Britain* in general, and more particularly to the *Highlands*; nay, of more Consequence than many at first View will be ready to see. It is allowed that Agriculture, properly pursued, is the first and surest Foundation of Wealth to any Nation. Of what immense Value to the Country must it then be, to have such large Tracks of barren Ground reduced into Tilth, especially as we can demonstrate, that it can be done after Mr. *Græme's* Method at an easy Charge, even when it is designed to return good Crops of Barley and Flax? To this we must add, that even the present Charge, (though very moderate) will lessen, when this Method comes to be understood and followed by more People. The poorest Farmer in the Country has Stock sufficient to enable him to cultivate a Moss Farm, after it has been once brought to Tillage; and, besides, he has the Advantage of being at once taught a proper and useful System of Agriculture; the Want of which Knowledge daily ruins many of our Country People, while they obstinately adhere to the absurd Practices of their Ancestors, and refuse to follow a better Method of Tillage, merely because it is new.

The Extent of these barren Fields over *Scotland*, the Hands they may employ, the Mouths they may furnish Bread to, the Quantity of Flax they may afford to our Manufacturers, and the Sufferings

ings of the Country, for Want of Grain these last Years, are all so obvious, that they need not be enlarged upon.

These are a few of the Advantages that must redound to the Country in general from Mr. *Græme's* Plan of Improvement; but with regard to the *Highlands*, it appears in a much stronger Point of Light. When we cast our Eyes over this Country, we find little but Barbarity and Idleness, with all the Train of Vices which generally follow these Evils, or at best, the rude and unpolished Beginnings of Society. In considering the present State of this large Country, we are of Opinion, that this System of Husbandry is most opportunely come in the Way, as a Mean to cultivate that Country, and civilize the Manners of the Inhabitants. The Method of Agriculture, proposed by Mr. *Græme*, will produce plenty of Potatoes in the low mossy Vallies lying at the Bottom of the high Hills in that Country, and at a far less Expence than it has cost Mr. *Græme* to raise it from his Mosses, because the mossy Vales in that Country have a larger Proportion of other Earth mixed in them. The Potatoe Crop must evidently be of great Use in a Country where Grain is so scarce and dear.

This Husbandry will also produce enough of Flax to employ their Families all the Year round, and furnish the Manufactories lately erected there with proper Materials. One particular Advantage of Mr. *Græme's* Method we cannot omit to mention, viz. That it is performed in all its Branches by Men alone, without the Help of working Cattle, which they neither have in that Country, nor have they Food to maintain them, though they had. And we can demonstrate, that a smaller Stock will make a *Highlander* a Farmer fit to cultivate these mossy Soils, with which his Country abounds; than was formerly requisite to furnish him with
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the Arms and Accoutrements he used to wear and employ in the worst of Purposes.

The Funds set apart by the Wisdom of Parliament, and mentioned in the Statute annexing certain Estates to the Crown, will, no doubt, when applied in the designed Manner, be of the utmost Advantage to the Nation, as the *Highlanders* will be furnished with something to do, and so prevented from disturbing the Tranquillity of others. We are humbly of Opinion, that the Introduction of Mr. *Græme's* Husbandry would greatly contribute to this valuable End; and therefore we think the Quarter Sessions should think of some proper Method to recommend this System of Agriculture to the Notice of the Publick, and particularly of those in Power, many of whom have distinguished themselves by a diligent Pursuit of every Thing that might contribute to the Wealth and Grandeur of their native Country. The small Expence that accompanies these Improvements, renders it particularly adapted to the Situation of the *Highlands*; and the Industry it requires, appears to us very proper for civilizing the Country, an Object that has deservedly engaged the Attention of the Ministry in several preceeding Reigns, as well as the present.

As in every new Scheme of whatever Kind, many Objections may be started, so in this we are now recommending. But we are certain, that any Objections we have yet heard against this Undertaking are easily removed, as they proceed more from Prejudice and old Opinions, than from any Difficulty in the Thing proposed to be executed. From hence we are induced to believe, that the more publicly this Husbandry is recommended, and the sooner it is countenanced by those in Power, the more quickly will it spread, and its Advantages be sooner and more unversally felt over
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the Nation, and particularly in the *Highlands*, where it seems to be most wanted, and where, indeed, the greatest Field for this Species of Agriculture seems to be by Nature herself pointed out to us.

We have now gone through the principal Articles we thought necessary to lay before the Quarter Session, in consequence of their Directions to us; and we shall think ourselves amply rewarded for our Trouble, if what we have here said be of any Use to dissipate the Prejudices hitherto combating this laudable Design, and to engage the Gentlemen of this, or any other County in *North Britain*, to emulate Mr. *Græme* in his useful Labours, while they have the pleasing Reflexion, that by this Method of Agriculture they approve themselves Patriots in the best Sense of the Word, improve their paternal Estates, and enjoy before Hand, the Blessings which late Posterity will not fail of bestowing on those who open new Sources of Plenty and Wealth in their native Country. *Sic subscribitur,*

John Callander. J. P.

Thomas Græme, J. P.

John Stirling of Garden.

John Buchanan, J. P.

David Graham of Meiklewood.

Follows a LETTER by Robert Maxwell of Arkland, addressed to the said Justices of Peace, relating to the Premises, written at the Desire of the Committee and others.

Gentlemen,

HAVING seen *Flanders-Moss* before Mr. *Græme* of *Ardgomrie* had acquired Right to any Part of it, he and I have since had several Conversations

versations concerning the Improvement thereof; in all which, to my Understanding, he discovered an uncommon Knowledge of the Subject: This disposed me to entertain great Hope, that he would prove, on his large Undertaking, that Moss is as fit, or fitter than any other Soil, for almost every Purpose of Husbandry. That Moss-Husbandry is the cheapest, and the Husbandry that would tend most to the publick Good, as being, beside other Reasons, executable on the smallest Charge, and without Cattle; and that therefore it can be carried on to full Advantage, where the Agriculture of no other Soil can be followed forth, for want of Provisions for labouring Cattle in the Winter Season, and by People totally disabled from pursuing the Husbandry of any other Soil, by Reason of their Poverty: From which, and other Considerations, it seems to be obvious and plain, that the Promotion of it is highly the Interest of the Publick, as well as of Individuals.

This my Hope was sometimes supported, at other Times weakned, by the different Accounts I received of the Success of his Labours. Prejudice disposed many to detract, Want of Knowledge of the Qualities of the Soil, and of the proper Methods of the Culture of it, made others, who wished his Success, at least doubtful: So the most general Account I received of it, was unfavourable; but to my great Satisfaction, I got into my Hands a printed Letter to a Gentleman in *Edinburgh*, concerning Mr. *Græme's* Improvement of Moss, and the Benefit thereof to the Nation, with other Papers annexed, and a Memorial concerning his Moss-Husbandry, all which I read with Attention and Pleasure, as they tended to remove Prejudices, and proved Truths, whereof I had for many Years the strongest Conviction, not founded simply on Speculation, but on various Experiments.

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These Papers having made their Way into many other Hands, Mr. *Græme's* Husbandry became the more to be the Subject of the Conversation of Companies in which I occasionally was; and many moved by Prejudice or Ignorance, attempting to reason against the Probability of his Designs, yea, even the Practibility of the Success of Moss-Husbandry, and others depreciating the Value of his Practice; moreover, some presuming to contradict Facts; I, willing to stop the Torrent to the utmost of my Power, and that I might be the more enabled to do it, resolved to see the State of the Fields, and to trust implicitly to no Man's Account.

Accordingly I have been with Mr. *Græme*, and other Gentlemen, through his Mosses, and have seen the Facts to be as represented in the Papers aforesaid; and in a Report of the Committee appointed by the general Quarter Sessions of the County of *Stirling* for visiting and examining his Mosses in *Stirling* and *Perth* Shires, with the Methods of Agriculture and Improvement thereof practised by him.

Now, when I have seen and carefully considered the present State and Condition of these Mosses, the Husbandry thereof, and Crops thereon, together with the judicial Evidences of a large Number of the lower Class of Farmers, and Mr. *Græme's* Workers, adduced for proving the Facts set forth in the said Memorial. I say, Evidences of Persons you must all reasonably presume to be prejudiced against his Husbandry, as indeed such are almost universally against all Husbandry different from their Ancestors Practice and their own, though not so new and singular as Mr. *Græme's*; and when I have read with Attention and Pleasure the Report before-mentioned, I make a lamentable and comfortable Reflexion at one and the same Time.

How

How lamentable is it, that Mr. *Græme*, who has gone so far at his own Expence, shown new Views of Agriculture, and proved beyond Contradiction, that Moss is a most improveable Subject, and highly profitable to the publick and private Interest, being manageable without Cattle, and at a far less Expence than any other Soil can be for Corn, should meet with so general Detraction, should unsupported have mighty Difficulties to combat, and should not have it in his Power to be served, but by such, as, by the Force of Prejudice, are unwilling to promote, yea, studious to disappoint his Success? But surely comfortable it is, that the Spirit of Husbandry is rising and diffusing itself at the very Mouth of our *Highlands*; that you have taken so laudable a Resolution, as to me appears plain you have done, when you appointed the Committee mentioned, and are thus showing a noble and Imitation-worthy Example to other Counties: By so doing you will be greatly promoting your own Interests; yea, you will be doing what is even more Praise-worthy, you will be promoting the Interest of the Publick in the most effectual Manner, and approving yourselves Patriots in the justest Sense of the Word.

I shall avoid taking any particular Notice of the Facts set forth either in the Memorial, or Report: Those of the Memorial, you see, are mostly judicially proved by Evidences of Persons who cannot be presumed to have favoured the Moss-Husbandry; and I should be very presumptuous, if I took upon me to say more concerning the Report, than that I am fully of the Opinion which the Gentlemen Visitors have given: I only beg Leave to add, that of the excellent Qualities of Moss, and of the Certainty of its being improveable, I have long been fully persuaded.

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All Mosses capable of being drained, are surely highly improveable, and Money may, past Doubt, be more profitably laid out on the Culture of them than of any other Soil, at the same Time that it is a more beneficial Work to the Publick. Some of my Reasons are, Moss, as it lies, is worth little or nothing: It very often buries the best of all Soils, if itself is excepted; but I consider it to be no original Soil, yet more improveable than any other, because I believe it to have been occasioned by the Fall and Rotting of Woods, which hath caused a Stagnation of Water, which has given Vegetation and Increase to the Growth of Weeds and Grass disagreeable to Cattle, and which therefore falling and rotting, hath, together with the Weeds and Mud subsided from the Water, increased the Quantity annually. Who can think otherwise, who see the Roots of Trees standing as they grew in the *stratum* under the Moss?

If this my Opinion is thought just, you will readily allow, that Moss is wholly composed of excellent Manures. I grant indeed, that their Spirits are weakned by a continued Stagnation of Water; but I am fully persuaded, by many Experiments, that by Ashes made of itself, any Moss may be so invigorated, as to enable it to produce the best Crops, even when Earth cannot be imported, to increase the Quantity of the Ashes, at an equal Expence to the moderate Charge of burning uncompounded Moss, until a sufficient Quantity of them be obtained; but this I will not enlarge upon, having offered my Opinion concerning it more fully to the Publick, in my Papers on the Improvement of Moss.

I shall only further observe, that as Moss is a most proper Soil for Flax, and as our Linen Manufactures are, surely, on a most dangerous Footing, while there is a Necessity to depend on foreign

reign Markets for Flax and Flax seed, it is a melancholy Thought to consider, that if Wars, or Pestilence, or Losses by Sea should prevent the Importation of them, our Spinners, our Weavers, our Bleachers, and others, who live by their daily Labours in the several Branches of the Manufacture, must, besides the infinite Loss to the Kingdom, be forced to the Necessity of begging, robbing, or stealing, all which may be prevented by the Promotion of the Improvement of Moss only, since it is fully experimented, that Moss by good, but different Culture, will produce exceeding fine, or very coarse Flax; and that a Soil of Moss and Clay mixed, and enriched by a sufficient Quantity of Ashes, will even improve foreign Flax-feed: This is certain, and if my Memory serves me, you will find it, and the Experiments proving it, recorded by the *Dublin Society* in their excellent Papers on the *Flax-Husbandry*.

Now, Gentlemen, for my own Sake it concerns me to show the Reason, why, I hope, you will think that I am not altogether officious. I have travelled Mr. *Græme's* Mosses, and viewed his Improvements with some of the Gentlemen Reporters, and by them and several others, I have had the Honour to be importuned, to offer you my Opinion concerning his Improvements, and the Probability of the Success of Moss-Husbandry, so I expect you will pardon me for the Trouble I have given you. I am,

Gentlemen,

Stirling, Aug. 6.

1754.

Your most humble,

and most obedient Servant,

ROBERT MAXWELL.

March

March 8. 1754.

MEMORIAL anent the Moss-Husbandry.

THAT every Tenant or Farmer that works himself, along with his Cattle and Servants, can earth an Acre of the Moss for twelve Shillings *Sterling*, better than any Mr. *Græme* has ever yet done; and if he do it with Men and Barrows, he may do it cheaper, though no Man will be convinced of it, without he make Trial; and then he will soon convince himself. He can pair it with Men for eight Shillings, and burn it for five Shillings the Acre, all which is twenty-five Shillings; allow five Shillings more for Extraordinaries or Accidents, makes thirty Shillings the Acre; and for this Charge, any Country-man can dress an Acre of the Moss to better Purpose than any that Mr. *Græme* has yet done, where he had the best Grain; because, when that Countryman is working for himself, he will take better Care of the Ashes, and of the Ploughing, than any Day Labourer that works to Mr. *Græme* for his Hire, without any Consideration further, of what is right or wrong.

This same Farmer, when he is to bring in any of the Outfield Ground of the Country, to carry Pease and Barley, he gives it three or four Chalders of Lime to the Acre, or generally a Chalder of Lime to every Firlot of Bear-sowing; he earths it fully thicker than the Moss is done, and gives it Dung or Tathing to the Bargain. Now let any Man make a rational Computation of that Expence, and he will find it double the Charge of the Moss, and he shall not have so good Grain either: At the same Time, if you talk to him of labouring the Moss, he answers you, Who can be at all that Expence of working the Moss? It is not for us
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that's poor Bodies, when he himself is labouring Ground at a much greater Expence every Year, and at that same Instant, possibly, that he is so talking to you.

When he is beat out of that, by a Comparison of the Expence, then he runs to this Defence, That his Grounds so limed and dressed, will last in Heart longer than the Moss : But let him consider, that his Grounds must be kept in a constant Succession of Pease, Barley and Oats, otherwise it will not last to any Advantage, but be run out to what it was before, or worse : So that every third Year it gets Earthing and Dunging, which keeps it in Heart.

Now, give the Moss the same Husbandry of Earthing and Dunging, or Ashes every third Year, and it must hold out longer ; nay, it will every Year turn to more Account by the Earthing and Tillage ; both thickning the Soil and rotting the Moss into a black loamy free Mould : So he may observe, by giving the same Course of Husbandry, the Moss will last, and perform better than the other Soils around it.

2dly, It has been shown, that at first bringing in both Soils, the Moss is by much the cheapest ; so in the subsequent Husbandry, as to Point of Expence, the Moss has greatly the Advantage too, as a little Earth and Ashes just at Hand, costs nothing to the Farmer, but to work instead of being idle. It is almost the only Soil in *Scotland*, where the Farmer can make it as rich as he pleases, without going from his own Grounds for any Kind of Manure, or giving Money out of his Pocket for Lime or Dung, when possibly there is little or no Money in his Pocket ; at least too many are in that Case.

3dly, It is almost the only Soil that the Farmer has at his own Option, to make it of what Consistency he pleases, for the different Grains he intends to sow : He can give it more or less Clay as

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he thinks proper. In short, he makes a Soil to his Mind. How much does this differ from the *Kerse* Soil that People are so fond of, where no Farmer can break it to any Mould or Consistency, unless the Season do it for him, by a strong Frost going off in *February* or *March*, without Rain, which very seldom happens?

4^{thly}, It is preferable to any Grounds in the Country in this, that a Man of a very small Stock is capable to labour a Farm of the Moss: He does not want a Number of Horse, Kine and Sheep, which costs a great deal of Money, and by the Loss of which a Farmer is too often broke: The Moss Farmer needs only a few Lads to work; if any of these die, or break a Leg, it is a Misfortune surely, but it is no great Loss to the Farmer. If he wants Seed, the Laird can safely advance it, till the Crop come from the Ground, as it is sown with a great Deal of less Seed than most other Soils.

What a happy Thing is this for a Day-labourer, to get himself so easily stocked into a good profitable Farm, and have People working under him, bring up his Family creditably, and set out a new Stock of Farmers, instead of a Breed of idle Beggars; and every Day-labourer, who is honest and industrious, may in this Manner get himself set up in a small Farm at first, and a few Years may make him able to take more, to take a large Farm, as he can work it all the Winter round: In Frost he can earth any Part of it, and in open Weather he can plow it; with this Observation, that the wetter he plow it, so much the better: As the Breast-plough can then easily plow deep enough, the Mens Feet and the Roller breaks it then to a Mould, the Clay mixes freely with the Moss, it rolls smooth, and then it is won in all Time coming: And as it is the least expensive Husbandry, so when it is once or twice right laboured, and
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the Ridges a little raised, it rolls smooth, and can then stand both wet Weather and dry Weather, better than any Soil around, either *Kerfe* or dry Fields.

In making Ashes for any Field during the Summer, a Field that is in Labourage, and a Crop upon it, and where the Farmer is to make Wheat when that Crop is cut down, he brings in a few Carts or Barrowfuls of Clay, to the Sides of the Ditches that surround the Field; then kindles his Fires with that dry Clay, and heaps on the Moss from the Ditches: When he goes Home at Night, or comes out in the Morning with his Men, or going or coming to Dinner, they cover the Fires with a little more wet Moss; so that before Summer is over, he has Plenty of Ashes for his Field, without losing a Day's Work on them: These Starts are scarcely missed from a Day's Work. Or, *2dly*, He could do the same at the Edge of the Moss, and carry in the Ashes; and may observe, that when a good Crop comes from the first Earthing and Ashing, it must be doubly so from the second Operation, where that Earth and Ashes are put upon a Sort of Soil, which was not the Case at the first Operation.

So that upon due Consideration, and laying Prejudice aside, if that can be granted, it must appear plain to every Capacity, that the Moss may be brought in to produce good Barley, or any other Grain, with much less Expence, than the outfield Grounds, either of the *Kerfe* or dry Fields.

2dly, That it can be kept in good Condition, and constant Tillage, cheaper than any of these Soils, and yield better Grain.

3dly, That any Countryman can labour a Farm of the Moss with Half the Stocking of any other Farm, and with Half the Risque, and have a better Return. And,

Lastly,

Lastly, That when it is right dressed and brought in, that Moss Farm will stand wet Seasons, and dry Seasons, better than any Soil around it; and therefore is the most eligible Farm for any Man in this Country, if Sense and Judgment are to have any Direction in the Choice.

This is the Memorial read to the Workmen and Tenants of the Moss, and sworn to by them before us, this Twenty-fifth Day of July 1754 Years. Sic subscribitur,

Thomas Græme, J. P.

James Fairfoul, J. P.

Follows the Depositions of the Country People referred to in the Report before-written.

AT Flandershill, in the County of Perth, upon the 25th Day of July 1754 Years; in Presence of *Thomas Græme* of *Duchray*, one of his Majesty's Justices of the Peace for the Counties of *Perth* and *Stirling*, one of the Committee appointed by the Quarter Sessions of the County of *Stirling*, for visiting Mr. *Græme's* Mosses, and Husbandry thereof; as also, in Presence of *James Fairfoul* of *Braeandum*, one of the Justices of the Peace of the County of *Perth*, compeared *Peter Macfarlane* in *Rouskie*, *John Paul*, late Residenter in *Linlithgow*, now Tenant of a Part of the Moss of *Pol-dore*; *James Leckie* Tenant of a Part of Moss-*Flanders*, *John Forgie* and *James Mitchell* in *Pol-dore*, *John Dow* and *John Symmie*, both in *Rouskie*, *Robert More* and *James Forrester* there, *Alexander Coupland* and *Andrew Leckie* in *Gartur*, all Workmen or Tenants on the said Mosses, belonging to the said *Hugh Græme* of *Ardgomrie*; who being all severally sworn and examined by the said Justices of the Peace,

Peace, depone, That the printed Memorial of the 8th of *March* last, now shown and read to them, and marked by the Justices, is, in most Cases, their Opinions anent the said Mosses, particularly the four last Positions, *viz.* *First*, That the Moss can be brought in to bear good Barley, or any other Grain, with less Expence than the outfield Grounds either of the *Kerse* or dry Field. *2dly*, That it can be kept in Tillage cheaper than any of those Soils, and yield as good Grain. *3dly*, That any Countryman can labour a Farm of the Moss with less than Half the Stocking of any other Farm, with less Risque, and have as good a Return. *4thly*, That when it is right brought in, that Moss-Farm will stand wet Seasons, and dry Seasons, better than any Soil around it, either *Kerse* or dry Fields; and this they declare upon Oath to be their Opinions. *Sic subscribitur.*

James Mitchell.

John Dow.

John Symmie.

Alexander Coupland.

Andrew Leckie.

Robert Moir.

James Leckie.

Patrick Macfarlane.

John Forgie.

John Paul.

James Forrester.

James Fairfoull, J. P.

Thomas Grame, J. P.

Follows the Act of the Quarter Session.

AT *Stirling* the 6th Day of *August* 1754 Years, which Day the Justices of the Peace of the said Shire met in their general Quarter Sessions, having heard the Report of the Committee appointed

pointed by the Quarter Session the 6th of *March*, for visiting and inspecting the Mosses in *Stirling* and *Perth* Shires, with the Methods of Agriculture by Mr. *Græme* of *Ardgomrie*. The said Committee having given in their Report thereanent in Writing; as also there produced a Missive signed by *Robert Maxwell* of *Arkland*, addressed to the said Justices of the Peace, relating to the Premisses. And the said Report and Missive being read in Court: The Meeting considering how very laudable Mr. *Græme*'s Undertaking is, and of what great Benefit it may be to this Nation in general. They do therefore judge it their Duty to appoint their Clerk to transmit to *Edinburgh*, to the Trustees Secretary, the foresaid Report and Missive, and other Papers relative thereto, to be laid before the said Trustees and considered by them, in hopes that they will fall upon some effectual Methods for promoting Mr. *Græme*'s Operations, in order to make the same more useful to the Kingdom. Extracted by me. *Sic subscribitur*,

Jo. Finlayson, Clk.

By the reading of these Papers, every Man capable of Conviction must be fully persuaded, that the deepest Moss, if drainable, is highly and exceeding profitably improveable; but, at the same Time, he must, no Doubt, desire to know why some Parts of Mr. *Græme*'s Crops were very bad, when other Parts of them were extraordinary good, and why he failed in his Design.

The Moss was surely the very same, as to its Quality and Deepness, where they were bad, and where they were good in the same Years; so the Cause must necessarily be, that either the Preparation of the Ground, or the Seed were bad, or that the sowing was unseasonable, where the Crops failed.

To give every Reason occurring, why his Design did not succeed, would be needless: But, as it appears now too plain, that though Mr. *Græme* had Knowledge of Moss Husbandry, he had not, when he commenced it, any Sum near equal to the Undertaking, I shall suppose, that when he sowed betwixt 1000 and 1500 Acres of Moss, at 1 s. 1 $\frac{1}{3}$ d. each Acre *per annum*, which, while unimproven, is not, I believe, worth 1 d. *per Acre* yearly, he expected to be joined by a Company, or to have obtained Assistance from the Publick, for carrying on an Improvement evidently tending so highly to the Interest of it.

When he found that he had Reason to despair of both, and that the Undertaking was far too weighty for him, especially as he had met with unfavourable Seasons, he has indeed chused to leave this Country, and so to allow his Design (which he had proved beyond Contradiction to be highly profitable, if properly executed) to go to Ruin: This is truly unlucky; as to the Inconsiderate, it may discourage Moss Husbandry; whereas it should have no other Influence, than only to caution against engaging any deeper in it (or indeed in any other Husbandry) than can easily and independently be executed to the full; and then the Improvement of Moss must be found to conduce more than any other Branch, to both publick and private Benefit, for the Reasons given in the preceeding Papers.

If the Style of the last Memorial, (by whom wrote I know not) shall not please the nicer Readers, I am sorry for it; but as it had been sworn to by so many Witnesses, it would have been highly improper for me to have attempted to dress it. On other Occasions, indeed, when I saw Reason for making Alterations, I have done it; for it is of no Importance by whom the Papers are wrote, reformed or amended, if the Husbandry be good,
and

and the Language plain and easy. Agriculture requires not the Elegance of a Novel, or a Romance : They have little else to recommend them.

The foregoing Papers on Moss Husbandry contain all the material Experiments, that, so far as I know, have been made on the Cultivation of that Soil, except those relating to red Bogs, (here called Flow moss) mentioned in two Letters published in the *Dublin Essays*. That the Directions for the Improvement of a Subject so valuable, and yet so much neglected by other Authors, may be here the more full and compleat, I shall insert them : The Letters follow ; you'll find them ingenious, instructive, and useful, as indeed the whole Papers in these Essays are.

MANY of our Readers (*say the Society*) will undoubtedly be surprized, upon Perusal of this Letter. 'Tis an extraordinary Attempt to raise good Hops in Bogs ; and especially in that Kind which our ingenious Correspondent mentions ; but as there was a Time in which the most common Things were new, it can be no Objection to this Method of Improvement, that it is a Novelty. On the contrary, since it has succeeded with the Author of this Letter, and the Usefulness of it is thereby out of Question, we have Reason to hope it will be doubly welcome to the Curious, as a valuable and new Discovery.

GENTLEMEN,

‘ **A**S I believe your Invitations to a general
 ‘ Correspondence were more than mere
 ‘ Formality, I have Reason to hope for your fa-
 ‘ vourable Acceptance of the following Hints.
 ‘ They relate to a Subject of great Importance in
 ‘ this Kingdom, and are grounded not upon Con-
 ‘ jectures,

‘ jectures, or the Information of others, but on
‘ my own Experience.

‘ It must be Matter of Concern to all, to see
‘ great Tracts of Land lying entirely useless, in a
‘ Country which has the utmost Reason to hus-
‘ band all Advantages with Care. Such are the
‘ many and extensive Bogs to be met with e-
‘ very where, which, except a poor coarse Pasture
‘ on the better Kinds, afford no other Profit to the
‘ Owner, than what can be made by burning
‘ the Soil of them in Turf. I hope, therefore,
‘ it will be an Attempt agreeable to Gentlemen of
‘ your publick Spirit, to introduce a Culture of
‘ them, which at a small Expence will turn to great
‘ Account, and to make those unprofitable Lands,
‘ without much Labour in reclaiming them, bear
‘ a good and valuable Crop. The Crop I mean is
‘ Hops ; and the Bogs in which I have reared them
‘ with most Success, the worst and most useless of
‘ all others—the red Bogs. The Profit has for
‘ many Years fully answered my Expence, and
‘ what has turned to my Advantage will do so with
‘ every body else in the same Method of Improve-
‘ ment.

‘ Few are so far Strangers in this Matter as not
‘ to know, that among the several Kinds of Bogs,
‘ the red are deservedly esteemed the worst. Black-
‘ Bogs yield some Kind of Pasture of a finer or a
‘ coarser Grass, according to the Nature of the
‘ Bog. They are besides more easily reclaimable,
‘ and if the upper Surface be skimmed off and the
‘ Sods burnt, they afford their own Manure, a large
‘ Quantity of red heavy Ashes strongly impreg-
‘ nated with Salts ; whereas the Red-bog has none
‘ of these good Qualities ; it has a spongy, light,
‘ fungous, variegated Surface, bears no Grass, and
‘ when you come to burn it, yields but very little
‘ Ashes, and even those white, fleaky, light and
‘ insipid.

‘ insipid. This is so well known, that these Bogs
‘ are never charged with Rent, but thrown into
‘ the Survey of Farms as unprofitable Lands: I
‘ have indeed reclaimed some of this Kind of Bog
‘ in a different Manner, and for other Purposes
‘ than for Hops, and therefore cannot join in cal-
‘ ling them unprofitable; but since they are ge-
‘ nerally so esteemed, and accordingly neglected,
‘ it will be of equal Service to my Country, to
‘ promote the Culture of them under Hops, as if
‘ they were really so.

‘ As one Letter cannot contain all I have to say
‘ upon this Subject, you’ll give me Leave, Gen-
‘ tlemen, to confine myself in this to the Man-
‘ ner of laying out the Ground, and to reserve the
‘ planting of the Hops for the Subject of a second.
‘ Should I crowd the whole into the Compass of
‘ one Paper, my Directions could not be particu-
‘ lar, as they must be in Essays of this Kind, to be
‘ useful to the Farmer. There are in the Execu-
‘ tion of any new Improvement many little Cir-
‘ cumstances which alleviate the Labour and les-
‘ sen the Expence, and tho’ they may appear tri-
‘ fling upon Paper, they are however of conside-
‘ rable Importance in Practice: These I shall take
‘ Leave to observe as I go on, being less concern-
‘ ed for Elegance and Neatness in a Performance
‘ of this Kind than for the Ease and Advantage of
‘ the Husbandman.

‘ Round the Spot intended for your Hop-yard
‘ dig a Trench seven or eight Feet wide to drain
‘ off the Water; give it all the Depth the Fall of
‘ your Bog will bear, and if you cut it into the Gra-
‘ vel ’tis the better; make your Trenches strait
‘ and every where of an equal Breadth; to that
‘ End lay them out and mark them by the Line.
‘ The Score or Mark is made in Uplands with the
‘ Spade, but in Bogs a Hay-knife is much better.

‘ —One

‘ —One Man will cut faster with this Instrument
‘ than five Men in the common Way.

‘ When that is done, take off the first or upper
‘ Sods of your intended Trench with the
‘ Spade, but beware of cutting your Sods too large;
‘ they are then inconvenient for Carriage, and increase
‘ the Labour of removing them. Make them
‘ of that Size that they may be easily turned up
‘ and thrown with Pitchforks on a Wheel-barrow:
‘ You may then at a small Expence convey them
‘ where they may be useful. The proper Use of
‘ them is to fill the adjacent Bog-holes, and level
‘ the uneven Places of your Bog. However, it
‘ will be necessary to reserve a few of them for
‘ facing your Ditch in the same Way as you do
‘ upland Ditches.

‘ When the first Sod is pared off, proceed to dig
‘ your Trench with Slanes. The Soil thrown up
‘ will be as good Turf as any other and defray
‘ the Expence of Trenching; and this I desire may
‘ be understood as a general Direction, and applied
‘ wherever a Trench or Hole of any Size is to be
‘ cut out in a Bog. By this Means the Charge of
‘ digging is made up to the Farmer in good Turf,
‘ and the Labour pays itself.

‘ In cutting your Trench be careful to leave a
‘ Gun on each Side of your Plot: This is a Piece
‘ of Bog uncut, designed as a Passage in and out,
‘ with a Channel for the Water bored in it; it must
‘ be nine or ten Feet wide, and the arched Channel
‘ under it of sufficient Height and Breadth to
‘ let the Water through. In short, a Gun is a natural
‘ Bridge, and must have the same Qualities,
‘ Strength in the Arch to afford a safe Passage over,
‘ and Wideness equal to the Discharge of Water.
‘ Two Men with Spades or Shovels thrusting from
‘ each Side till their Tools meet, will make one
‘ in a little Time.

‘ There

‘ There is another Circumstance to be observed
‘ in the making of your Trench : At the lowest
‘ Part of it where the Water is discharged, leave a
‘ Bank of two Feet high uncut, to keep it to that
‘ Height in the whole surrounding Drain. By this
‘ Means you have a Reservoir at Hand for the Use
‘ of your Hop-yard ; which, whenever a dry Sum-
‘ mer happens, will require to be well watered ;
‘ and besides a ready and cheap Manure from the
‘ Sludge or Mud which will lodge at the Bottom of
‘ your Trench when the Current is checked by
‘ this little Bank. Some indeed may fear that the
‘ inclosed Ground may suffer by this Method, and
‘ be kept too moist by the Water about it ; but
‘ this I am, by long Experience, satisfied is a ground-
‘ less Apprehension. The flowing Water, with a
‘ fair Vent before it, has little lateral Pressure, but
‘ directs its Way where it has the freest Passage. I
‘ have made large Drains in a Bog, and kept them
‘ full of Water within a Foot of the Brim, and
‘ found no Inconveniencies attending it.

‘ When your surrounding Trench is finished, at
‘ four Feet Distance from the inner Edge of it,
‘ and exactly parallel, draw another inside Trench
‘ of two Feet wide and two Feet deep ; let it be
‘ drawn like the former round the Ground and by
‘ the Line, then fill it up with proper Soil and
‘ plant Sallies in it, or any other Aquaticks fit for
‘ Poles. They will thrive here exceedingly, and
‘ with proper Care, in six Years Time be ready
‘ for the Use of the Hop-yard. The Earth about
‘ them is kept moist by the Bog about it, and their
‘ Roots preserved from Frosts and Winds by the
‘ Distance of their Stand from the Edge of the
‘ main Drain ; and therefore nothing can prevent
‘ their Growth : To forward it as much as possi-
‘ ble, two Cautions should be used : The first is to
‘ strip off the Side-Shoots when tender, to prevent
‘ their

' their running out into strong Branches, which
 ' impair the Body of the Tree; the second to
 ' throw up the Mud out of your Trench upon
 ' their Roots, and that Way to supply them with
 ' fresh Nourishment. This should be done when
 ' your Sallies are two Years old: At that Time,
 ' and in the Heat of Summer, cut the little Bank
 ' which keeps up the Water in your Trench, and
 ' leave the Drain entirely dry: The Mud at Bottom
 ' will grow stiff and be easily thrown up, and
 ' your Trees manured at very little Charge.

I am, &c.

A.

The Second LETTER.

GENTLEMEN,

' **Y**OU'LL give me Leave to proceed in my
 ' Instructions on Bog-Hops without Intro-
 ' duction or Apology, and to address myself di-
 ' rectly to the Farmer.

' When you have prepared and inclosed your
 ' Bog in the Manner described in my former Let-
 ' ter, at fifteen or twenty Feet Distance from
 ' the Sally-Trench, stretch a Line parallel to any
 ' one Side of your Inclosure. To this Line tie
 ' Rags or Feathers nine Feet asunder from each
 ' other; and when your Line is stretched upon
 ' the Ground, at every Mark or Feather drive a
 ' sharp Stick into the Bog to determine the Centre
 ' of your Hop-hills. Having finished your first
 ' Row, remove your Line to nine Feet Distance,
 ' and mark out a second; from that proceed to
 ' a third Row, and so on until you have finished the
 ' whole Plot. The Ground being thus set out,
 ' and the Centres of your Hop-hills regularly dis-
 ' posed at nine Feet Distance from each other,
 ' your first Work will be to dig a Hole at every
 ' Centre,

Centre, three Feet wide and three Feet deep ;
to lay the upper Sods of it in the Hollows of
your Bog, and to make Turf of the remaining
Soil. If you proceed in your Work that Summer, your Turf must be wheeled off immediately, spread and made upon other Ground, otherwise it would prevent the Passage of the Tumbrils which you have Occasion for in your next Business. This is to fill your Holes with proper Earths or Composts in order to receive the Hopsets, which are to be planted here, and afterwards managed in the same Method as in other Places. To do this, it is obvious that much Earth will be wanted in a Plantation of any considerable Size ; and how to provide himself with a sufficient Quantity at a cheap Rate is of great Importance to the Farmer. My Method is as follows : In the Upland nearest to the Bog, I take off the Swerd of a small Plot with the Hoe or winged Plough : I burn it, and by thorough plowing mix the Ashes with the Mould. To these I add a little Lime, rotten Dung or rich Garden Mould, and throw the whole together into Heaps where it heats and rots, and in a little Time affords the richest Compost and the best Soil for Hops. I have made artificial Earths in this Manner not only for the present Purpose, but in other Improvements also, and found it, upon Trial, a great deal less expensive than it appears at the first View. The Carriage of them to the Bog is the heaviest Article in the Expence, and this also is much alleviated by the Breadth of the Alleys and the Method of planting the Hops in Holes. As the tough Surface of your Bog is no where broken, but in the very Spots where the Hops are planted, it affords a safe Passage for your Cattle ; and as your Walks are six Feet wide, the Hills being but three Feet over, and the Cen-

‘ tres nine Feet distant, you may make use of
 ‘ Cars and Tumbrils, a cheap and commodious
 ‘ Carriage.

‘ I own, that notwithstanding these Precautions,
 ‘ this Improvement is expensive; but raising Hops
 ‘ in any Ground is so, and, I am sure, greater in
 ‘ the most favourable upland Situation than in
 ‘ Bog. A very little Arithmetick will show that
 ‘ ditching and inclosing, which in Bog is no Ex-
 ‘ pence, the Turf made at the same Time being
 ‘ equal to the Charge; that plowing, harrowing,
 ‘ fallowing, and digging, which in my Method are
 ‘ entirely saved, with the additional Articles of
 ‘ dunging, hoeing, and paring the Alleys in Up-
 ‘ lands, are more than an Equivalent for all the
 ‘ Labour and Expence attendant on Bog-Hops;
 ‘ and from fifteen Years Experience, I can ven-
 ‘ ture to affirm, that the Produce from the latter
 ‘ is as great in Quantity, and in Quality as good.
 ‘ Many Reasons might be given why it should be
 ‘ so; some of them I beg Leave to lay before
 ‘ your Readers. They may be necessary to re-
 ‘ move the Prejudices which generally attend new
 ‘ Projects, and to make this Improvement as com-
 ‘ mon in this Kingdom, as I am sure it will be
 ‘ beneficial whenever it becomes so.

‘ Were it peculiar to my Method I should rec-
 ‘ kon it the first Advantage of it, that the Hills
 ‘ stand at nine Feet Distance; but as this may be
 ‘ imitated in Uplands, I shall only say in general,
 ‘ that nothing is more prejudicial to Hops than
 ‘ close planting.

‘ The Care taken in Uplands to hoe and pare
 ‘ the Alleys, sufficiently shews that it is esteem-
 ‘ ed a Disadvantage to have any Quantity of Grass
 ‘ growing among Hops: Red Bogs are by their
 ‘ Nature free from this Inconvenience, and, at
 ‘ least, for many Years till the Surface is intire-
 ‘ ly

ly altered, throw up none or very little. How far Planters are right in their Opinion, that a Coat of Grass impairs the Action of the Sun upon the Fruit, I shall not here examine, but while that Opinion holds it will ever be a Reason in Favour of Red-Bogs.

Watering Hop-Grounds in dry Seasons, tho' from the great Expence attending it too frequently neglected, is certainly of great Benefit to the Crop. This may be done in Bogs with great Conveniency and little Charge. The surrounding Drain is a constant Reservoir where the Planter may be readily supplied, and whoever understands the Culture and the Growth of Hops, will reckon this no small Encouragement.

'Tis agreed among Hop-Planters that low Grounds have great Advantages, they are little exposed to Droughts, and sheltered by their Situation from destructive Storms. Bogs enjoy those in common with the rest, besides, as long Experience has informed me, some peculiar to themselves. They don't suffer so much as other Flats by the Rains of a wet Season, or the Moulds of a dry one. Whether their Spunginess affords a Passage to the Waters which lodge in other Grounds, and their constant Moisture prevents the bad Effects of too much Heat, I shall not now examine; but the Fact itself is certain, they are free from the Inconveniencies above-mentioned, and, what is more remarkable, from those Swarms of Insects which too often infest our upland Hops.

I must add that in this Kind of Planting, the top Roots have Liberty to shoot as far as Nature designed they should: They have three Feet of the richest Soil to go thro' before they run in to the Bog, and even there, when once it is well drained, they'll meet with better Juices than in

‘ a cold stiff Clay or a sharp four Gravel, which
 ‘ are the common upland Bottoms.

‘ I shall conclude by obviating a Doubt which
 ‘ might perhaps occur to some of your Readers;
 ‘ Poles will stand in these Bogs as firm as in up-
 ‘ land Ground. The Earth laid into the Holes
 ‘ pressed together, and confined by the tough
 ‘ stringy Substance of the Bog, will sufficiently
 ‘ support them, and they need be sunk no deep-
 ‘ er than Improvers direct in other Hop-yards.

‘ You may observe, Gentlemen, that I have en-
 ‘ gaged no farther in Hop-Husbandry than to ex-
 ‘ plain what was peculiar to my Method. The
 ‘ ingenious Treatise published on that Subject, un-
 ‘ der your own Inspection, will inform the Reader
 ‘ in the general Management of them; and to that
 ‘ I must refer him, till you are pleased to resume a
 ‘ Subject which deserves your second Thoughts as
 ‘ well as any other. When you do, I shall beg
 ‘ Leave to throw in my Mite, and send you some
 ‘ Observations I have made upon the usual Cul-
 ‘ ture of them.

I am, &c.

A.

*MEMORIAL and QUERIES, by Mr.
 BETHUNE of Kilconquhar.*

MR. Bethune has an Inclosure with Stone and
 Lime Dykes, the Extent about eighteen
 Acres, and the Soil generally a strong Clay. It
 has been pastured for seven or eight Years; the
 Grass is good and thick, but never riseth to a pro-
 per Height for mowing. The Reason, 'tis believ-
 ed, is, because Dung could never be spared to it;
 but Lime could be got at an easy Rate, and a con-
 venient Distance.

Queritur,

Quæritur, What Method shall be taken to improve this Piece of good Ground, both for Corn, and Grafs for Hay?

N. B. He can command black Earth, or light sandy Ground, to mix with the Lime.

He has likewise divided by Ditches into four Inclosures, about forty Acres of low-lying Ground, of different Soils: Part of it is strong Clay, Part Moss, and Part a lighter and opener Clay: Three thereof have been plowed by narrow Ridges, except where Wetness, and the Thickness and Strength of Rushes made the Plowing at least difficult, and seemingly unprofitable. Where the Ground has been plowed, it produces good Corn, and kindly low Grafs mixed with white Clover. The Method was, to plow two Years, and graze three; but no Good was got of the Balks, or the Ground left unplowed, being sour and rushy. The fourth is now fully drained. It never was plowed, but can admit of Tillage, and carries a small one-piled four Grafs. The Body of its Earth is of no good Quality, being a Mixture of bad Clay and Moss.

Quæritur, What Method shall be taken for Improvement of these Inclosures?

N. B. There can be Drains made to carry off the Water from all Parts of them.

He also wants your Opinion concerning his In-field or mucked Land, (as it is called). It is kindly free Earth, without Stones, of a black and red Mixture, not sandy. This Ground, if it is much dunged, runs excessively to Charlocks, &c. and it is full of Quickens and Cutch Grafs; which are so injurious, that last Year they quite overcame his Barley while it was in the Brier or Braird, and so stifled its Growth, though it had got three Plowings.

He has also about three Acres marshy Ground, formerly overflowed; and therefore called a Loch.

'Tis

'Tis so drainable, that the whole of it may be laid dry. Where it is firm, it produces good Grass for Hay; but where it is not so, and continues as Quagmire, it is all Fog at Top, with a short spinly thin Grass. The Memorialist can conveniently get good Earth and Lime for compost Middings, and desires the Society's Opinion, how he shall likewise improve the two last mentioned Soils?

The Society's Answer.

AS to the first, it appears that the Ground is good and strong, and that it might very soon be made as profitable as the Infield. It is therefore advised, after pasturing it this Summer, and before plowing, to lay betwixt sixty and seventy Bolls of new slaked Lime, *Linlithgow* Measure, on each Acre where the Ground is strongest, and only betwixt fifty and sixty where it is weaker. Let it be laid and spread with your first Conveniency, at least by the Beginning of *September*; and against the Middle of Winter a good deal of it will be washed into the Roots of the Grass, whereby the Turf will by that Time be rendered tender, and will plow the more easily. In the Spring sow Oats, next Year Pease, third Year Barley or Bear, and therewith Clover and Rye-grass.

Let only one half of the Inclosure be managed as directed; and observe, that, after the Barley or Bear is cut and carried off, Cattle be not allowed to pasture upon the young Clover; for their Feet tramp it down, and Water standing in the Holes through Winter, starves and kills it; besides, when the Grass is not ate, it keeps the Roots warm, and as it rots, becomes a Dressing to the Ground, and in that Way does more Service than in Pasture.

Cut only one Crop yearly of your Clover and Rye-grass for the three ensuing Years, and feed

Cattle

Cattle upon the after Growth ; which, being watry and soft, crines and dries in (when made into Hay) to a small Bulk, and is of small Value in the Opinion of the Merchant in Comparifon of the firft Crop, which is generally better win and coloured, even tho' the Season fhould answer to the getting of the fecond, which it feldom does.

In this Way of uſing the one Crop for Hay, and the other for Paſture, you take two Occaſions to meliorate your Ground ; for, while the Clover is growing for Hay, many of the vegetated Seeds of Weeds, that by their Nature are not ſo quick Growers as the Clover itſelf, are chocked and killed by it, and thoſe that are able to ſtruggle with it, are therewith cut down before they come to Seed, at leaſt before it be ripe ; ſo there muſt be a great Deſtruction of Weeds yearly, while Ground is under Clover thus managed ; and Clover being a Legum, as well as Peaſe, meliorates the Ground as much, if not more, than they do, by rotting the Surface, retaining the nitrous Particles that come by the Dews, Rains, and otherwiſe, and by its falling Leaves, which, for Want of Air, diſſolve into a ſlimy or oily Subſtance, which is waſhed into the Earth while the Sun and Wind have no Acceſs to exhale or dry it up, the Clover ſtanding ſo thick upon the Ground.

While the Cattle are feeding upon the ſecond Crop and after Growth of the Clover, and the tender young Sprouts of ſuch Weeds as may be ſo hardy as not to be killed, being cut while in their Sap, the Ground muſt be enriched by the Dung and Urine of theſe Cattle ; and though they ſhould not incline to eat all the Weeds, even thoſe they leave cannot, after ſuch Diſcouragement, come to Seed ſo late in the Season.

If you chuſe to have the Ground continue longer in Clover, in place of cutting it for Hay the
third

third Year, let it come to Seed, and be full ripe, and then put Cattle thereon for eating it. What Seed is trampled by their Feet, and what passes by their Dung being spread, will in Part supply the Ground of new. In the ensuing Spring, harrow the Field, adding a Strinkling of Clover, Rye-grass, or Seeds from Hay-lofts, before harrowing. After this, you will be able to judge whether it will be more profitable to continue the Field in Grass as directed, or to take Crops of Grain and Clover alternately, *viz.* three Crops Grain, Pease being the second, and three Crops Clover.

Plow up the other Half of this Inclosure, which, without Lime, must be in a Condition to give a good Crop, having lyen so long in Grass in the Pasture-way; then sow Oats, and have a Middling of Lime, the light sandy Earth, a little Dung, and as many other different Ingredients as you can get ready, prepared according to the Directions given in the Answers to Mr. *Scot of Rossie's* Queries, p. 26. to lay upon it next Spring. The more differing in their Natures and Qualities these Ingredients are, the greater will the Ferment be; and the greater the Ferment, the richer will the Middling become. After the Manure is laid on, and carefully spread, plow and sow Pease; which, by Experience, (as by the Nature of Things they must) are always found to enrich Ground when they prove a good Crop; and to dung for them with a well prepared Middling, is surely a probable Way to get it.

Immediately after the Pease are reaped, plow down the Stubble, to lye so all Winter. In the Spring give a Steering-fur, as it is called; then the Seed-fur; and then sow Barley or Bear, with Grass Seeds. This Method will require less than the Half of the Lime, and yet have a notable Effect; for the compost Middling will by this Time be well incorporate with the Earth; and, by the Ef-

fects

fects of it, and of the Pease, and by the three several Plowings for the Barley, the Ground must necessarily be fine and mouldy for it and the Grass Seeds; both which require and delight in a fine Mould. We have the rather directed two Ways of improving this Inclosure, that you may try both, and report to us which of them succeeds best.

As to the second, concerning the four Inclosures of low-lying Ground of different Soils, we are glad to hear from you, that the Water can be carried off from every Part of them; and you will do well to do it without Delay, and effectually, since you yourself have observed, that it is it that occasions the Inconveniencies you meet with, and the Infertility of the Ground; for you tell us, that the Ridges that are plowed, and no doubt gathered up, produce good Corn and kindly Grass, mixed with Clover; whereas the Balks are full of strong Rushes.

Such Management of the Ground must necessarily have produced such Effects; for the mixing of the Soils by the Plowings, and the gathering up of the Ridges, dried, sweetened and mellowed the plowed Ground; and so it produced good Corn, and good Grass: But the Water descending from them, soaked into the flat-lying unplowed Balks of sour uncultivated Earth, and fostered the Rushes, which live luxuriantly when they get such Food and plenty of Drink. To deprive them of the last, without which they won't live long, you have Directions for draining, in the Answers to the Lord *Kilkerran's* Queries, p. 14.

Since the Soils of these several Inclosures are the same, the like Improvement may equally well suit them all: However, if you please, you may let three of them lye in Grass till the fourth be improven; for the less that is undertaken at one Time, it is commonly the better execute; and the

greatest Profit, as well as Satisfaction and Content, comes by doing Things to Purpose. That these Inclosures may be cultivate as they ought, begin with one of them, which being fully drained, plow up the Ridges, that were gathered before, by a cleaving Fur, any Time before Barley-feed Time, or immediately after it; and in the mean time pare the Balks, burn the Turfs, and spread the Ashes.

About the Middle of *June*, if by that Time the Turfs be burnt, cross-plow, without missing the Balks; and, in the Middle or End of *July*, harrow the whole Field once and again, the oftner the better, with the largest and weightiest Harrows you have, in order to break the Clods. Those that are unbroke, both of the Moss and Clay, gather into Heaps for burning upon Whins, Broom, or any other Thing that is combustible, that they may the more readily take Fire; but observe in the burning, never to allow them to go into a Flame: To prevent which, order a Servant to attend, to add more Clods where he may perceive it to break out; for the slower they burn, and the more you stifle the Flame, you will have the more and better Ashes: At the same Time prepare, and have in Readiness on the Field, forty or fifty Bolls of Lime to each Acre.

After the Ashes and Lime are both well spread, give the Ground some more harrowing, to break the Clods that are not fully burnt: The heating they will have got, will make them fall and crumble down with the Harrows. These Things being done, plow up the whole Field into Ridges with a handsome, narrow, ebb Fur, and water-furrow it well, to lye dry all Winter. In the Spring, as soon as the Season offers, plow up the Ground again, sow Barley, give it a gentle harrowing; then sow Clover and Rye-grass, and give it a little more harrowing. The Method of using the Clover is prescribed *p.* 94.

Perhaps

Perhaps you may think, that in this Way you get too few Crops of Grain after so much Preparati-on ; but we have known many People repent that they laid down Ground with Grass-seeds when it was in bad Heart or dirty, tho' we believe none, after Experience, ever had Reason for so doing when their Ground was rich, fine and clean. If it be laid down to Grass rich, it will be rendered richer ; and where can be the Danger or the Damage, since a good Crop of Clover will always be found to be a profitable Crop, got upon small Expences ? However, if you will, you may delay sowing the Grass-seeds, until the third Crop, which you may take either of Flax or of Barley, having made Pease or Beans the second. If you take Flax, which will prove a good Crop, if the Season be favourable, the Seed good, and right sown, plow up the Ground immediately after the Pease or Beans are cut. You should do the same for Barley : Being well water-furred, let it lye so all Winter. In *March* plow it twice, and sow the Flax and Grass-seeds : They agree well together ; for the Flax will be little or nothing the worse of the Grass ; and it will be vastly the better of the weeding of the Lint, and of the pulling of it. The first frees the Clover of Weeds and natural Grass, and the last feeds it, as being a Kind of Hoeing.

If the Directions here given for managing this Inclosure be exactly observed, and diligently followed forth, we shall not doubt but you will have great Reason to go on chearfully with the Improvement of the other three in the same Way.

As to the third, concerning the Infield, you observe very justly, that the more you dung it, the more the Weeds grow, to the Destruction of the Grain : It never will be otherwise, till the Seeds of them, or at least, the greatest Part of them, are killed ; for while they live, they will grow the more readily and vigorously, the more the Ground
be

be dunged. We know no better Way of getting quit of them, than by encouraging their Seeds to vegetate, and then to destroy the Plants; which will be so far useful, as they will in part dung the Ground: The best Way to do this, is by Summer-fallow, or Horse-hoeing Husbandry.

Since killing of the Weeds is the chief Thing aimed at, we think proper to advise you, when Summer-fallowing, to harrow thoroughly immediately after every Plowing; which will give you an Opportunity to take out and burn the Roots of the perennial Weeds: The small Mould will excite their small Seeds to grow; the smaller it be made, the better it will answer the Purpose. When they are up, plow them down; harrow again; take out more Roots and burn them; and so on, as long as the Season of their growing continues: Then plow up the whole Fallow-ground, to lye as rough thro' the Winter as possible.

Early in the Spring, harrow fine, to encourage more Seeds of Weeds to grow; and take out more Roots, if you can find any. By the End of *April*, for all that has been done, there will probably be a plentiful Crop of them, which plow down, and sow Barley; but take Care you harrow it in no more than is absolutely necessary to cover it, lest the Seeds of Weeds, still undestroyed, should, excited by the Fineness of the Mould, get up before the Barley and choke it, notwithstanding what has been done. Wherefore, if you would have Patience, and be persuaded to take full Vengeance upon the Weeds for the Ills they have done you, we advise, as thinking it the most profitable Way, to omit sowing the Barley, and to go on this second Summer with a Fallow, as directed for the last; by which they must be altogether, at least very near extirpate. In *August* sow Wheat, when your Ground must necessarily be in a Condition

to give a good Crop of it, considering that the Soil is naturally good, is so long and well fallowed, and that the tilling down of each Crop of Weeds was a dressing to it.

The ingenious Mr. *Tull* tells us of a poor Man, who thro' Necessity took the like Method; because, when he had the Ground prepared, he could not get Seed, which occasioned such a Crop as was worth more than the Value of the Land it grew on; and a Tenant of Sir *John Paterfon's* of *Granton*, being under the same Necessity, followed the like Course upon almost his whole Farm; and had such a Crop, that he was thereby enabled to pay a good deal of his Debt; and, by continuing the same Method, came in a few Years to be in a Condition to have purchased the Farm.

After the Wheat, sow Pease, which, it may be expected, will be a good Crop; and if it be, will enrich the Ground, and, overtopping the Weeds, destroy such as grow with it. Immediately after the Pease are cut, plow down the Stubble, which will do Service to the Ground. Early in the Spring, plow again, and harrow it, which will encourage more Seeds of Weeds to vegetate. In the End of *April*, plow them down, and sow Barley and Grass-seeds; which Grass use and manage as before directed. If this Course of Husbandry do not defeat the Weeds, we know nothing can so well do it as more and such like Fallow, or Horse-hoeing Husbandry, by which a Crop of Beans on the strongest of the Land, and of Potatoes on the lightest of it may be got; and, notwithstanding all the Effects of Summer Fallow obtained; but we hope you will be near at an End of the Trouble of Weeds, unless their Seeds come along with the Seeds of Grain, or with Dung, which it is your Business to prevent as much as you can:

With

With respect to the last, the marshy Ground, we must take Notice, that, like a good Physician, you find out the Disease and the Causes of it ; and it is lucky that the proper Medicines are cheap, and conveniently to be got. It is plain from your own Representation, that an Excess of Water is the Cause of the Distemper ; for, where you have sufficiently drained, you own it produces good Grass for Hay : Where it is still a Quagmire, what can be expected but the Fog and spinly thin Grass you speak of ? The compleat Draining that brought a Part of it to yield good Grass for Hay, will no doubt bring the rest to do so too. Since the whole can be drained, fall to Work, and do it to the full : When it is drained, and has had Time to subside and fall, which it will do when the Water is fully run off, cause Men with Turf-spades pare off the foggy Surface, and burn it to Ashes as prescribed : Carefully and equally spread them, sow Rye-grass and a Mixture of the small Clovers, then cause Men harrow the Ground, if it will not bear Horses, by which the Mould will be raised, mixed with the Ashes, and the Grass seeds covered.

The whole having been water-fed, perhaps from the Flood, yea, probably the whole upper *stratum* being nothing else than the Particles of fine Earth subsided from the Water, we cannot think that it needs any Superinduction of other Earth. Indeed the Stagnation having made the Salts and Spirit of the Earth slow and sluggish, it wants much to be invigorated ; and this the Ashes, with the heavenly Influences, will in a good Measure do, when the Cause by the draining is removed : But, as an Assistant, Lime may be sowed very thick, or carefully spread upon the Surface : The Lime being small in its Particles, having many Superficies, and being open and porous, is a fit Recipient of the Nitre and Spirit of the Air, which flies about here
and

and there, where it listeth, until it find a kind Host to receive it, which it, for the Reasons assigned, is: All which will conspire together, to pulverise the Surface and impregnate the Soil.

Inclose the whole Field with Sallows or Hoop-saughs, or what you please, and make a Dam with a Sluice at the lowest Part, which will give you Opportunity to work Water upon it; which, by the Settlement of the Mud falling down therefrom, will be a yearly Supply, and keep it in such Heart and Strength, that you may mow it annually, and get valuable after Growths for Pasture for ever, without any Aid whatsoever, if the Water be only carefully wrought, and with Judgment.

The *Dublin Society* have given a just and succinct Account of the Method and Advantages of flooding Ground, in these Words: "When the Farmer can thus command the Flood, and make it subservient to his Profit, he has a constant Manure at hand, which will soon reward his Labour and Expence. However, he must manage it with Caution. The Beginning of a Flood is the best Time; it is then foul and muddy; and, as it fines, deposits a rich Slime, which improves the Ground beyond any Manure whatever. When that is done, the Water will soon clear, and then is the Time to discharge it. If a Flood lies long upon Ground, it will chill and spoil the Grass; but if it lies two or three Days only, it will enrich the Soil without doing any Damage."

QUERIES for the Right Honourable the Lord Ross.

THE Ground is inclosed, and lies mostly level. The Soil, being light, sandy and channelly,

nelly, is much over-run with Broom, and some Whins.

1^{mo}, What will be the best and easiest Way to free the Ground of the Broom and Whins?

2^{do}, What the properest to manage it to the best Advantage?

3^{tio}, Which are the best Means of bringing it to continue good Pasture for a Course of Years?

4^{to}, How to bring some Part of it, laid out into Walks and Plantations, to be Hay or Meadow Ground? And what Grass-seeds may be properest to lay it down with? for the young Trees will prevent the pasturing of Cattle for many Years.

There is also a Piece of low Ground upon a River-side, designed to be made Meadow, and kept free from Cattle for some Years. It is a tolerable mixed Soil, but much worn out.

5^{to}, What may be the best Method to bring it into, and continue it in good Meadow?

6^{to}, There are some Acres of a good mixed Soil, not much worn out: What is the best Way of managing that Ground to the greatest Advantage?

7^{mo}, There is some moist boggy Ground, with a thick, strong, coarse Grass, which may easily be drained: What will be the readiest and cheapest Method, to bring it soon to good Meadow?

All these Grounds ly four Miles from *Edinburgh*; but there is no Dung to be got without great Expence.

The Society's Answers.

IN answer to the three first Queries, the Broom and Whins, if the Plough cannot master them, must be hoed or grubb'd up. Being burnt upon the Ground, and their Ashes spread, they will in part meliorate it; then plow up the whole Field for a Summer-fallow, and take out the Roots of the Broom

Broom and Whins as the Plough gives Opportunity. The first Fur having lien some time baking in the Sun, harrow and cross-plow it. After a short Time, harrow and plow again; the oftener the better, while the Season continues dry and warm.

We are fully satisfied, that although two, or, in some Cases, three Plowings may make light Ground lighter, as occasioning it to have more and greater Cavities; yet that all that has been said or wrote about breaking the Heart of it by plowing, or thereby making it lighter, is vain, if the Plowings be often enough repeated. Mr. *Tull*, who has been very useful in many respects, has sufficiently exploded all that, we believe, can be said against what we advance.

Even harrowing, before it get the Seed-fur, cannot hurt it, because harrowing, as well as plowing, conduceth to make the Parts finer: The smaller they are made, the nearer other they will go, and the closer will the Earth become. Thus it is evident, that by Pulveration it is made to participate of the Nature of strong Ground, and to become more valuable, its Fault of Lightness being thereby cured.

Indeed, it may be made so fine, that it may be difficult to get the Seed covered when it is sown in the common Way, and the giving it much harrowing for that Purpose makes it still finer at Top, and the properer Nourishment for the small Seeds of Weeds, which require less covering and a smaller Mould than the larger Seeds of Grain, wherefore they get up before the Corn, and, growing fast in the Mould they delight in, choke the Grain that happens to grow: When Rain comes in the mean Time, the fine Earth, being smaller than the Seeds of Corn, is washed down below, leaving them exposed to the Sun and withering
O Winds,

Winds, and so many of them never grow; or, if they do sprout, for want of Earth to nourish them, they wither away: Then the thoughtless Husbandman, not discerning the true Reason, thinks he has broke the Heart of his Ground.

Moreover, the Surface, made so fine by the Harrows, is apt to batter after Rain: However, these Inconveniencies and Losses, and all others that can attend making any Sort of Ground fine by the Plough, or by the Harrow, may, in our Opinion, if the Ground be made only fine enough, be prevented by sowing Grain of all Sorts under Furrow, and giving the Ground very little or no more harrowing*.

We hope, since our Papers may happen some time or other to be published, you will pardon us, for the sake of others who don't understand the Reasons of Things so well as your Lordship, to observe, that it is most material that all Seeds be laid in the Earth at a proper Deepness; and, when sown under Fur, the Plowman can lay them high or low as he pleases.

If they are laid too deep, they cannot get up; if too shallow, though some of them, such as Pease, will spring or come up; yet in a short Time they decay and go away, which in this Country is called *flitting*, and which seems to be no uncommon Thing; for Mr. *Laurence* mentions, that his Parishoners at *Yelvertoft* in *Northamptonshire*, had not one Year of five a tolerable Crop of them, and sometimes not their Seed; but that he could not persuade them to sow under Furrow, because they were wedded to their old Way; and besides, could not conceive how the Parson should know more about Husbandry than they did, until he was obliged to reason with them from that Passage of Scripture, *For want of Depth of Earth they withered away*, and by leading the Way himself.

Upon

* *Male subactus ager, qui satis frugibus occandus sit. Columella.*

Upon Observation we believe it will be found, that such Kinds of Grain as do not so usually decay away, as Pease often do, are either of a weak Growth, or, if an extraordinary Strength of the Ground make them strong, they lodge and fall when their Seeds have not been laid at a Depth proper for the Pasture of the Roots, and for keeping them fast in the Earth. So it is to be remarked, how essential it is to good Husbandry, to pulverise well, and then to sow under Furrow.

During the Time of the Summer-fallow, prepare Middings of Lime, the strongest and best Earth you can get, and Dung, if upon any moderate Expence it can be had, according to the Directions given in the Answers to Mr. Scot of Rossie's Queries, P. 26.

In the Beginning of *April*, harrow the Ground, that your Manure may spread the more easily and equally; when laid on and spread, sow Barley where you judge the Ground in best heart, Oats where you think it is weaker, plow both down with a narrow light Fur, and harrow only once in a Place. Thereafter sow Rye-grass, and the white and yellow Clovers mixed, allowing the greater Quantities that the Ground is designed for Pasture, and harrow them very gently. From the cutting of your Corn until Summer, be sure no Cattle get into the Field, lest their Feet should break the Surface, and destroy your Grass.

The Roots of the Broom and Whins having been all taken out in the Course of your Summer-fallowing, such as rise from Seeds may be pulled out while young, nigh as easily as so many Thistles, if you observe to time that Work immediately after Rain, while the Ground is soft, being soaked with it, especially after Frost. This is the most certain Way we know of to get free of them, and should upon no Account be neglected; for a Man
may

may pull as many in half a Day, while they are young, as he could hoe in a Month, if they got leave to grow old. Besides, by pulling, all Damage by them is prevented; whereas, if omitted, they not only overspread, and render the Ground under them useless while they grow, but also spring again from the hoed Roots; and before they are hoed, they shake innumerable Seeds, which spoil the Ground more and more.

If some Plants shall be found to be so strong rooted, that by the Hand they cannot be pulled without an Assistant, a sharp Spade may be proper for that Purpose; and the Root being cut within the Ground, the Plant will then pull with great Ease, without lifting the Turf. Though it shall break at the Neck, or betwixt the Root and the Green; and so it be found necessary to raise the Turf, to get out the Root, the Turf may be put in its own Place, with the green Side upwards: In neither Case need the Swaird be spoiled. Or, which will cut less Ground, a Spade may be made for the Use, the Mouth only four or five Inches broad, with a Wing out from it for setting a Man's Foot upon; or, as you think best, you may make an Iron Instrument, somewhat bending and cloven in the one End, resembling a Hammer, and in the other, with a Hose or Socket, as a Fork is made for holding of a Pole or Shaft; which being fixed into the Hose, it may be thrust down into the Earth, the Cleft opposite to the Root of the Plant, and one of the Toes or Prongs on each Side of it; which done, there is an Opportunity given to press or squeeze out the Plants with their Roots, in the same Manner as Wrights or Smiths do Nails. These two last Instruments may be made so light, neat and genteel, that a Person of Distinction may use one of them in his Hand as a Staff, and, as he walks through his Farm, amuse and exercise himself

Self very agreeably and profitably, while pulling out a Whin, Broom or Weed, as it comes in his Way; for, with a little Contemplation, he will plainly discover, that as he pulls, and so destroys, he is vindicating his own Property, and freeing himself of so many Robbers, who, like Drons in the Hive, not only force themselves into the Place, and greedily devour the Food of his profitable Plants, but propagate and increase yearly as they shake their numerous Seeds: By the Use of either of these two last mentioned Instruments, the stronger Weeds, that cannot be pulled by Hand, may be taken out of Corn-fields without any Hurt to the Grain worth the regarding. There, among the stirred Earth, they do greater Damage, and multiply more than on Grass-grounds.

Weeds are so hurtful, and therefore so provoking: So hard it is to get them extirpate wherever they are, and they intrude every where, that, in hope of your Lordship's Forgiveness, we have been excited to say more than is needful in the present Case, with a View to the Information and Instruction of the less knowing; for since, as you are pleased to let us know, this Field is designed for Pasture, it may be sufficient, if, for a Course of Years, you cause a Man with a Scythe cut them all down when they are in full Sap, and before they seed. The Cuttings rotting upon the Ground will be in part a Dunging, and the Rains entering into the cut Roots, will concur and combine with the stagnating Sap to rot them, and will do it effectually, if this Method be taken with them for some Years, and the sooner, if the Shoots that arise after the first cutting be also cut down. All this may be a Work of small or no Expence, since the Herdsman may do it as a moderate Exercise. But this Method will not have the same Effect upon young Whins or Broom; for the more they

they are kept down, the more Damage they do by overspreading the Ground.

It seems needless to tell your Lordship, that, though the Ground be designed for Pasture, it is profitable to carry off the Stones, and throw them into Pools of Water, or to bury them in deep Pits, if you have no Use for them. This is a cheap Way of purchasing Land; for every Stone you cause lift, adds to your Pasture in Proportion to the Extent of the Ground it covered: At the same time that, by so doing, you free the Ground of the Trouble of so many of them, whatever the Purpose be to which you may think fit to apply it afterwards.

We repeat the foregoing Directions to the *fourth* Query: But if the Ground be already planted, give it a good Coat or Covering of the compost Middling prescribed; which, if you were to content yourself with natural Grass, would make it grow both thicker and longer: But, since you desire to have these Walks and Plantations laid down with Grass-seeds, we know no better Way, than to cause dig down the Dung with a Spade, and to sow Pease for one Year's Crop. Next Year cause dig it again, and sow Barley and Clover of any Kind you please; but we think, considering the Digging and Dungging proposed, and that the first Crop was Pease, the Ground may bear the large red Kind, which will yield a greater Burden for Hay than the small white or yellow. The last Method, though more expensive, we think, will prove most profitable; on account of the Benefit the Trees will receive from the Earth's being digged, and the Soils, with the Manure, mixed about them. The want of which digging, manuring and mixing of Soils, and consequently mellowing, fermenting, and pulverising the Earth, and so preparing a free and uninterrupted Pasture for their Roots, and providing

viding a sufficient Quantity of nourishing Food for them, is the chief Reason why so many Plantations do not thrive.

In answer to the *fifth* and *sixth* Queries, the Ground being a good mixed Soil, partly much worn out, and partly not, give it all a compleat Summer-fallow, and, being well water-furred, let it ly as rough through Winter as possible. In the Spring harrow it, and lay on seventy or eighty Bolls of Lime to the Acre of, at least, that Part of it which is in worst heart. Then plow the whole, and sow Turnips; dress and spend them, suitable to the Directions in the Answers to the Lord *Kilkerran's* Queries, P. 5. or Sir *Archibald Grant's*, P. 19. as, for the Reasons there assigned, you shall think most proper.

When the Turnips are spent, plow up the Ground, and sow Barley, with the red Clover and Rye-grass, since you design to keep it free from Cattle for some Years; or you may sow only the one half with Turnips, and the other with Pease, each in their proper Seasons. What you sow with Pease, plow down immediately after they are cut: By this early plowing, the Ground will get a partial Fallow, and the Stubble of the Pease, which may be cut high, will, in Proportion to the Quantity of it rotting in the Ground, meliorate it. In the Spring, give the Pease-land another plowing, and sow Barley with Grass-seeds as proposed for the Turnip-ground.

As to the *last*, concerning the boggy Ground: The first Thing to be done, and which is indispensable, is to drain it well. Then, your Lordship may follow the Advice given in Mr. *Maxwell's* Essay on Moss, P. 37. or in the Answers to Mr. *Bethune's* Queries, P. 97. as to you seems most expedient.

QUERIES by Captain HALKET of Pitfirran.

THE Captain has a large Meadow, which was last Year double ditched; the Ditches are six Feet wide; the Dike between the Ditches eighteen Feet broad, raised three Turfs, with Thorns planted in the Face on each Side; and five Rows of Hoops are planted on the Top: The Soil is a good black Mould, with a little Moss in it. This Meadow has for a great many Years been kept for Hay; but, being always, before it was ditched, wet in Winter and Spring, the Grass of it is become very sour, full of Sprets, and in many Places fogged. Lime is to be got easily.

Queritur, How this Meadow should be managed, so as to destroy the Sprets, made free of the fogging, and to yield better Grass?

There are about two Acres in a Corner of it, which it is thought could not be tilled for more Crops than one; because, if the Swaird was once broke, it, being lower than other Parts, might be too wet and deep, and the Cattle might sink and stick.

Queritur, If these two Acres cannot be tilled for a second Crop, how should they be ordered to destroy the Sprets and Fog?

He has also some other Inclosures ditched as this Meadow is, which are now perfectly drained; but, being before this Year always wet, the Grass of them is sour, and they are very full of Rushes. The Soil is mossy, with Clay under the Moss.

Queritur, How these Inclosures should be managed, to destroy the Rushes, and make them yield better Grass?

Nota, Last Season the Thorns which were planted in the Face of the Ditches, were part of them

put under the uppermost Turf, and part under the second. Most of these planted under the second Turf have held, and made good Shoots; but many of these put under the uppermost went back: Such as held, made but weak Shoots, when compared with the other.

The Water is already about a Foot and a half from the Surface of the Ground; and there is a Foot of more Level.

In the *first* Query, there is a very small Mixture of Moss, with a good black Mould of near two Feet Thickness: The Clay under it is from half a Foot to one Foot of Thickness.

In the *second* Query, the Soil is a great deal more mossy. When you are one Spading down, the second is full of Leaves, and some Vegetables; under which Spading there is sometimes Clay, and sometimes Sand.

The Ground is already so drained, that the Flood never covers more than the Breadth of two or three Ridges, where it breaks over the Banks of a little Water; and, so soon as the Flood abates, it is again dry.

The Ground lies so, that it will not be requisite to make covered Drains.

The Society's Answers.

BEFORE we proceed to answer the Queries, we cannot but take notice, that Water is the chief Cause of all the Diseases your Ground labours under; and therefore, since you have more Level, use it to the full. Which being done,

In answer to the *first* Query, relating to the large Meadow, which you want to have made more fruitful of Grass, and sweeter of its Nature, it is proposed, that the Turf be pared off with Turf Spades; and that Fires be kindled in several diffe-

rent Places with such Fewel as can be easiest got for kindling the Turfs, after they are dried: But cause Care be taken while they are burning, that they be not allowed to flame; for the slower they burn, the Salts of the Ashes will dissipate the less.

After the Turfs are burnt, let the Ashes be equally spread the first calm Day that comes; and cause the Places where the Heaps stood be pared clean, tho' it should occasion a little Hollow; for the Fire will have given an enlivening Heat to these Places. At the same time cause thirty or forty Bolls of Lime be spread upon each Acre.

If you think proper to sow with any Winter-grain, plow in *August* or *September* at furthest, with a narrow ebb Fur, that the Lime and Ashes, near the Surface, may the better feed the young Corn, and keep it warm. But, if the Design be for a Summer Corn-crop, cause the Furrow be made a little deeper, that the more Mould may be sweetened and meliorated with the Winter-frosts, and that the sour, steril Juices may evaporate.

If for a Summer Crop, cause plow it again, and a little deeper than at first, about the Beginning of *April*, that so the Lime and Ashes may be all brought up to mix with the Mould: This should be done in narrow Ridges, not high raised, and Care should be taken, that all Water be carried off by little Rills made with a Spade after the Field is harrowed, if water-furring by the Plough be not sufficient.

You may, after the second plowing, sow Barley or Oats, though the Barley is most advisable; because it can be done in a more advanced Season, when the Ground will probably be drier; and a Crop of Barley will more readily reimburse the Charge of the Improvement.

In regard that the principal Design of the Labour prescribed is for the Improvement of the Ground for Meadow, and not for bringing it into a Course of Tillage, it is advised, if the Ground be rendered mouldy, to sow Grass-seeds with the Barley; and the Grass-feed that seems properest for this End, is the great Meadow Corn-grass, which grows in such Ground spontaneously, where the same is in any tolerable State of Fertility, and free from that sour, sterile Quality that the Ground in the Query appears to be of. With this Corn-grass may be sown any other good up-land Grass-seeds; and, if you please, you may add thereto a small Quantity of Rye-grass, and the white and yellow Clovers: But they will, we apprehend, be of no long Continuance; for this Meadow-grass will soon overcome them.

This Corn-grass Seed may be got from Mr. *Eagle*, Seedsman to the Society: But by Reason that some Grasses, the Clovers especially, don't prosper, except where the Mould is small, and that Grass cannot be cut low, where the Surface is not smooth and equal, if it is not become fine at sowing the Barley, it will be proper to delay sowing them until another Year, and then sow Oats with the afore-mentioned Grass-seeds; or, rather sow Pease, and Barley again for the third Crop, and therewith sow the Grass-seeds.

The Preparation of this Ground by the Turf-spade is proposed, rather than by the Horse Paring-plough, because the Moss is but of a small Deepness; and when it is even pared by the Turf-spade, the mossy Earth remaining unburnt will be no more than sufficient to make a reasonable Mixture with the Clay that is under it: Whereas, should the Horse-plough be used, it might not only waste too much of the Moss, but likewise diminish the
Height

Height of the Ground above the Water-run to an improper Degree.

The two Acres mentioned in the *second* Query, are to be ordered as directed for the other Part of the Meadow: But, if they be so deep of Moss as not to admit of a second plowing in the Spring, let the Ashes be plowed down before Winter, as prescribed, but not with so deep a Furrow; and before sowing the Corn, let the Lime be laid on equally, well spread, and in the Quantity proposed, or more if you please. Then cause the Grain and Lime to be well harrowed into the Ground together; after which, sow the Grass-seeds, and harrow them slightly.

The Ground to which the *third* Query relates, may be managed as directed in the Answer to the *first*, seeing no better Husbandry can be applied to Ground in the Condition represented than Den-shiring: But, to save Charges, the Horse-plough may be used, if the black mossy Earth be not thinner than eight Inches, and that your Ploughman can make the Furrows no deeper than four; in which Case four Inches of Moss will be left to mix with the Clay.

Now, that the Ground is supposed to be fully drained, and laid down with Grass-seeds, if the Water that formerly overflowed it can, upon moderate Charges, be so stopped by a Dam as to cover it when you please, put a Sluice in it, in order to work the Water upon it, as directed in the Answers to Mr. *Bethune's* Queries, *p.* 103. the Effect of which will be as there set forth.

As to the different Growths of the Thorns mentioned in the Query, it is evident, that this has proceeded from those planted under the upper Turfs being more exposed to the Drought than those under the second; wherefore it is advised, to cause a careful dextrous Hand cut out the dead

or

or decaying Sets, put fresh ones in their Places, fill up the Slit or Cut with the best Earth that can be got, and thereafter put on another Row of Turf with more Mould at the Back.

Before we conclude, it seems necessary to add this Caution, That where Ground is to be improved by Denshiring only, there should not be taken off it above two, or three Crops at most, before it be laid down to Grass; and which of those Numbers may be most proper, the Nature and Strength of the Soil, and the Quantity and Quality of the Ashes obtained by the burning will direct; for Denshiring differs, in this respect, from Dung, that though the Ashes have a stronger attracting Power of the Nitre of the Air, and other heavenly Influences, than the insipid Earth had before it was burnt, and as consisting of smaller Particles, and being more porous, are fitter Recipients of them; yet Denshiring only makes Ground more capable of exerting itself, and therefore is not only soon wasted by Tillage, but, when exhausted, is in a weaker Condition than formerly. So that the Difference betwixt Dunging and Denshiring may, not unfitly, be compared to the Difference betwixt a Dram and a Meal of good Meat, to a Man when faint and hungry: The first may revive his Spirits, and enable him to labour some time longer; but when the Effect is over, he will be in a weaker Condition than before he got it: Whereas the last will give him new Supplies of both Spirit and Strength, and put him in a Condition to labour a much longer Time, his Strength being thereby better supported.

Additional Queries for Captain HALKET.

THE Captain has a Field of thirty or forty Acres of Ground perfectly drained; the greatest Part of it was yearly tilled for a good many Years past, but yields very poor Grain.

The Soil of it, in one Place, is a cold blue Clay, three Feet deep.

In another Place of this Field, there is a cold white Clay, also three Feet deep, and without any Mixture of Sand.

In a third Place, there are four Inches of moorish Earth, and below it a yellow Clay mixed with Sand.

In a fourth Place of this Ground, there are six Inches of moorish Earth, with two Feet of Sand and Channel under it.

Adjoining to this Field, there is a Moss, and Lime may be had.

1mo, Queritur, How should this Ground be managed, to make the different Soils in it produce good Corn and Grass?

2do, If this Ground should be brought into this Condition, how shall it be kept in it?

He has another Field of eight or ten Acres, also fully drained; the first Foot is good Earth and Sand mixed, and under that is one Foot of blue Clay and Sand mixed. Lime may be had for this Ground, but no Moss.

Queritur, How should this Field, which is so run out, that it yields little, tho' it has not been tilled for many Years, be managed, to make it produce better Corn and Grass?

The Society's Answers:

THE first and second Queries consisting of four different Branches, it is answered to the *first*, That it appears, since the Soil is Clay, that it is chiefly owing to the Stiffness, Solidity, Boundness and Unmouldiness of it, that the Crops of Grain are so poor and of so little Value; for Clay has much vegetative Food in it; but the Plants having neither Hands, Teeth, nor Instruments to divide with, cannot use it till it be pulverised, no more than a Man, let him be ever so hungry, could, without these, or some other Assistance, satisfy himself with a Joint of raw Beef, or any such unprepared Provision; and as the Beef, to make it the fitter for his Mouth, and the more agreeable to his Stomach, would want to be turned on the Spit, and roasted; so this cold deadish Earth, wants equally to be prepared for the Food of Plants, by frequent Turnings and Bakings in the Sun, whose Influences will not only extract the steril Juices, but enliven it; and whose Heat will join Issue with the Contusion of the Plough, to pulverise it, break it into Pieces proper for their Mouths, and make Way for their Roots to go in search of it, which, till it be attained by them, remains useless: Therefore give it a compleat Summer-fallow; you cannot plow it too often, nor over-harrow it, before you give the Seed-fur.

Seeing you can get Lime, and have plenty of Moss at Hand, compound Middings thereof, with Dung, if you can spare it, Scourings of Ditches, dusty Earth from Horse-paths; in short, as many Varieties as you can get; for the more the Heterogeneity be, the greater will be the Fermentation, as we have said on other Occasions: But though the Lime is not to be withheld or spared; yet
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be sure, the greatest of any of the Quantities be Moss; for besides that Moss, of an opening Nature, will assist greatly to separate the bound Particles of the Clay; it will also, when reduced to Powder or small Parts, serve in a great Measure to enrich it, Moss being made up of excellent Materials, as Mr. *Maxwell* has shown in his Essay, P. 38. You have distinct and separate Rules for Summer-fallowing, P. 24. and making and mixing Middings, P. 26.

Your Summer-fallow having lien as rough as possible thro' the Winter, and tightly water-furred; in the Spring harrow it well, and break the Clods; then lay on plentifully of your Middings, which being well spread, plow down, and sow Barley. Next Year, take a Crop of Pease: When they are cut, plow down the Stubble as soon as possible. Next Spring, give it a steering Fur, as they call it, then a Seed-fur, and sow Barley and Grass-seeds.

After the Ground has brought Grass from Grass-seeds three Years, plow it up, take a Crop of Oats, then a Crop of Pease, and next a Crop of Barley with Grass-seeds: When you find your Ground wear out of Heart, renew your Fallowing and Dunging, and take Crops of Corn and Grass as prescribed.

The same Method is to be followed with respect to the *second* Branch, with this Variation, that, after it is cross-plowed in the Summer, when you see the Clods dry, cause gather them together in Heaps, and, kindling them with such Fuel as you can most conveniently get, burn them, and spread the Ashes, as directed in the Answers to Mr. *Bethune's* Queries, P. 98. which will produce the Effects there taken notice of. The like burning will be also proper for the blue Clay, if it does not fall with the Plowings. Though the Clods do not burn to Ashes, the Heat will make them
fall

fall the more easily by the subsequent Labour, and will also enrich the Soil.

As to the *third*, pare it with a Denshiring Horse-plough, and burn as prescribed: The Ashes being spread, plow it up in Ridges, and let them lye well water-furred all Winter. Early in the Spring, harrow it, to mix the Clay brought to Top (which will be brittled by the Winter-frosts) with the Ashes, and any moorish Earth that remained unburnt; then cross-plow it. After lying some time exposed, harrow it again, and lay on forty or fifty Bolls of Lime to the Acre; which being spread, plow the Ground into Ridges the same Way as at first, and sow Barley; but give it no more harrowing than is absolutely necessary to cover the Seed: If the Mould is become very fine, sow it under Furrow, and give it only a gentle Touch of Harrowing.

The moorish Staple of the *fourth* Branch being no thicker than six Inches, and having only Sand and Channel below it, the same cannot reasonably admit of any Diminution by burning. The best Method, according to our Judgment, will be, to give it a Summer-fallow, to let it ly cross-plowed all Winter, and in the mean time to be preparing Middings of your Clay, Earth, and Lime, made up and mixed suitable to the Rules offered, P. 26. In the Spring, harrow, lay on, and spread your Middings, which (since they have no Dung in them, the fertilising Juices whereof might be exhaled) will, we are much disposed to think, rather gain than lose, by lying some time exposed at this Season of the Year to receive and retain the Effluvia, Nitre and Spirit of the Air; which Lime, by its Nature, and the Clay, by being reduced to small Particles, is very apt to do.

In *June*, plow in this Manure, and sow Turnips; for sowing, hoeing, and spending whereof, you
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have

have several Directions in the Answers to the Lord *Kilkerran's* Queries, P. 5. and Sir *Archibald Grant's*, P. 19. We leave it to you to follow which of them you please.

By the fallowing, manuring, growing and spending of the Turnips, the Ground, bad as it is, must surely be enriched, and brought into a Condition to yield a reasonable good Crop, which you may take of Barley if the Turnips were good, and of Oats if they were bad or indifferent. Take Pease for the next Crop, and Barley or Oats, as you find your Ground in Condition, for the third, and therewith sow Rye-grass and a Mixture of several Clovers.

When you turn up the Ground again, take Oats for the first Crop, Pease for the second, Barley for the third, and therewith sow Grass-seeds as before; and so on; but how soon soever you find your Ground wearing out, repeat fallowing, manuring, and the Turnips.

If you do not chuse this Way, and to bestow so much Labour; after the first Crop of Grain, wherewith Grass-seeds should be sown, lay out the Ground into regular Plots and Divisions, with Walks or Avenues separating them, and plant all the Plots promiscuously, and very thick, with all or most Kinds of Trees; while they are young they will shelter, and so nurse up one another; and as they grow up, and begin to incumber, the worst may be weeded out, and, for some Use or other, will do more than return all the Charge they have cost in the Purchase or by the Planting: As Firs are the best Shelterers and Nurses, plant one of them betwixt each two of any other Species.

When the sown Grasses wear out upon the Avenues, give them a Summer-fallowing; on which sow Pease, plow them down for a Dunging, and next Year sow Barley and Grass-seeds: By these

Flow.

Plowings, the Trees will be benefited, for the cutting of their big Roots will occasion their putting forth small ones more numerous, and many Fibres; which running into the Walks among the stirred and enriched Earth, will cause the outer Rows grow stronger and taller than the rest, and by their Beild occasion those within to grow the better likewise. Thus it appears, that the more you labour and manure your Avenues, the more you improve your whole Plantations.

As to the Query anent the eight or ten Acres perfectly drained, the first Foot good Earth, the second blue Clay, both mixed with Sand, (though worn out) there seems to be small Difficulty. In the *first* Place, we can propose nothing better than a Summer-fallow, as directed. *2dly*, Liming, with a little Dung, if you have it; or, if you have Sheep, fold them in Hurdles upon the Fallow. As you are able to dung, so you may crop with Grain; and with the last Crop, sow Grass-seeds, or fallow again; but if you sow Grass-seeds, take particular Notice that you do not over-crop your Ground; for it never was, nor never will be good Husbandry, to wear it out before sowing them, but *è contra*: Yea, though you design a Summer-fallow, you should not run it out; for the richer that it is, it will, during the Fallow, draw the more Riches from the Atmosphere; *Minus habentibus, minus datur, et vice versa*.

QUERIES by Sir WILLIAM BAIRD of Newbaith.

SIR *William* has purchased about fifty Acres of Ground, whereof nine is Meadow, pretty good; the rest is all Heath or short Heather, very full of strong Whins. About twelve Acres of it
has

has suffered the Plow three or four Years, and produced pretty good Corn.

Quæritur, What shall be done, to bring them to good Grass, and to keep them free of Whins?

The rest of the Field is untouched; but, Trials having been made, the Ground seems pretty strong, being Clay and Sand mixed.

Quæritur, Which is the best Way to improve it for Corn, or for Grass?

The Querist is near Lime, can provide the cleaning of Ditches, and wants to improve this Field and the Policy of it; because it lies near his House. The Field is somewhat wet, but it can be drained.

The Society's Answers.

THE Soil, tho' hitherto neglected, being very improveable, we are glad, for the Good and Ornament of the Country, that it is become the Property of one so able and willing to bestow upon it, both for Profit and Policy, which are not inconsistent. The first Steps to be made are, inclosing, dividing and draining; but before you fall to work, it is fit to make a Plan; because, while your Design is only on Paper, it is easily altered and reformed, as for Conveniency or Pleasure you desire.

When you have planned out the Field to your Mind, inclose and divide it by double Ditches, leaving a Space of thirty or forty Feet betwixt them for planting. The Planting when it comes up, besides the Pleasure of it, will turn to great Account; and the Inclosures yearly, while it grows, will thereby be sheltered and kept warm. If the Ditches necessary for inclosing and dividing the Ground do not sufficiently drain it, make further Use of your Level till you lay the whole perfectly dry.

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These Things being done, (and no doubt, Sir *William* conducting them, they will be well done), the twelve Acres already in Tillage, if they be in heart, may be made fine and mouldy, and laid down with Grass-seeds; if they are not, they may be brought into it by a well ordered Summer-fallow, and the Application of compost Middings of Lime, the Cleanings of the Meadow-ditches you mention, Dung if you can spare it, and as many different Ingredients as you can get, made up, ordered and mixed, suitable to Rules offered P. 26. and, in the last Case especially, you have Reason to expect plentiful Crops, first of Corn, and then of Grass; which, to make sure Work, we advise you to sow with the first Crop of Grain: For although the fallowing and the manuring proposed will surely put the Ground into such a Condition, that it could yield repeated good Crops of Grain; yet no Loss can attend the Want of them, since large Crops of Clover, with only a small Mixture of Rye-grass, will not only be equivalent, but they, whether cut or pastured, will, at least, keep the Ground in as good Condition as they found it, while the Clover prevails: Whereas, if by more Crops of Grain the Ground be more worn out, the Grasses must be proportionally worse, and the Improvement by them the less.

As to the keeping of the Ground free of Whins, you will find Directions given, in answer to the same Query proposed by the Lord *Ross*, P. 107. & *seqq.* which will hold in Practice.

The rest of this your new Purchase, is first to be cleared of the old Whins, by hoeing or grubbing them up; and then you may try two Ways for further Improvement; the one is, by denshiring, and mixing Lime with the Ashes; the other, by Summer-fallowing, and liming at the same time. We believe either may do well: But Experience,
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the best Teacher even of the wisest, will, to your own Observation, prove which answers best. We shall only add, that if your Crops prove equally good after the Fallow, it is more adviseable to continue that Course of Husbandry than the other; because, by it there is no Consumption of the Staple, as by burning there is.

Mr. SCOT of Scotstarvet's Letter to Mr. HOPE of Rankeilor, Preses, with respect to Sea-ware.

S I R,

I Had the favour of your Letter, wherein you desire, in the Name of the Society, to be informed of the Nature of Sea-ware. The Method of using which, all along the Coasts of Scotland, is so universal, and the general Good arising from it so well known, that you can expect from me nothing new about it, for most of the Gentlemens Estates that are situated near the Coasts, and my own in particular, would decline in more than the half of their present Value, if it were not for the Benefit of this excellent Manure; by the Help of which, Land, that would not otherwise be worth ten Shillings the Acre, pays from twenty to forty.

It is mostly used for Bear; and the Farmers watch every Opportunity when it is thrown in by the Sea, and lay it on at all Seasons, in Autumn, Winter, and Spring. But if they could have it at their Choice, in my Opinion, it would do best about the Month of *March*, immediately before their steering; for being then plowed into the Ground, and plowed up again to the Seed, it is incorporated and blended with the Soil: Whereas, if it be laid on in Autumn, before the fallowing or first plowing, it is too much wasted before the Spring;
and

and if it be laid on to the Seed-fur, it is apt to burn the Ground in a dry Season, though it will do very well in this last Method in a wet Summer.

It has no long Continuance ; for the Effects of it the second Year are but just felt, though in strong clay Land they lay it on thicker, and give it no other Manure for three Crops, *viz.* Bear, Oats, Pease and Beans *.

There is a Kind of Land along all the Coast which is gravelly, and covered over so thick with Sea-stones, that, to look at it, one would not think that Corn could spring through them ; and there is another Sort of Land that is a deadish Sand : To both these Grounds Sea-ware is the only Manure ; for Dung of all Kinds has been often tried, but with no Success, and yet Sea-ware brings excellent Crops of Bear. To this Kind of Ground they generally give but two Furrows ; and they chuse to lay on the Sea-ware before the first plowing. They sow Bear two Years following, and the third Year Pease ; and every Year that they sow Bear, they lay on the Sea-ware ; and so repeat the same Method †.

There is no such Thing as ley Land upon the Coast, nor Land that has not carried Crops without Intermission since the Memory of Man : But I have known the Ware carried up, in the Summer-time, a Mile or two from the Sea, laid upon ley Ground in very ill heart, and after it a very good Crop of Oats, tho' the Ground be but once plowed,

* I cannot doubt but this Method might be altered to Advantage, by throwing out the Oats, sowing Bear, and Pease and Beans alternately, and laying on the Ware for every second Crop of Pease and Beans.

† I think it would be a better Way to sow Bear and Pease alternately, and to lay on the Ware to the Pease.

plowed, and sometimes Bear, if plowed again in the Spring.

They seldom or never make Use of it in this Country with any Mixture; but I tried it mixed in the Summer-time in a Middling with Earth that was but very indifferent, and next Spring I laid it on to the Seed-furrow, and had a very good Crop of Bear: For tho' the Ware will melt away and evanish, yet the Earth with which it is mixed will retain its Salts, and have their Effects upon the Ground on which it is laid.

What I have hitherto observed is only of Ware thrown in by the Sea, which the Farmers call *Income Ware*: But there is a Kind of Ware that at low Water they cut from the Rocks, which is of a much stronger Nature, and will last full three Years; this costs them much more Labour, but brings them greater Recompence; and I think the best Time of laying this on the Ground would be in Autumn, before their fallowing, because it is not so soon wasted as the other; and by this Means it would exert itself more for the first Crop.

Sea-ware does very well in Kitchen-gardens, produces Pot-herbs and Roots of all Sorts; and by its Help I have seen them of an extraordinary Size. I have known it laid about Fruit-trees, and they became, from being perfectly barren, very fruitful. In the Winter-time it may be mixed moderately with Earth that is about the Tree; for too much of it would kill the Roots: But in the Summer Time it must only be laid about the Tree above the Surface, because, by digging the Earth in that Season, the Roots of the Tree may be indangered by the Drought of Summer.

As the Farmers of this Country prefer this Manner to any other, especially for their light Grounds, so it is by far more easily transported; for one Load
of

of it will go as far as two of Dung, though indeed they have generally a bad Road from the Sea-shore, being either deep of Sand, or rocky.

The Practice of Summer-fallowing has not yet obtained among the Farmers of this Country; so that Sea-ware, so far as I know, has not been tried upon a Summer-fallow: But I doubt not but it would do very well, especially if it be plowed down immediately when it is laid on.

LETTER and QUERIES directed to Mr. HOPE of Rankeilor, as Preses, and by him communicated to the Society.

S I R,

I Have two Inclosures, of twelve Acres each, fenced with Stone and Lime Walls. When I inclosed this Ground, it bore a short Heath, and in some Places a four Grass. It was quite over-run with Broom or Whins, which I made the Labourers dig up. Thereafter it was plowed and cross plowed, drained, and then dressed with Dung, other Earth, and the Lime of old Houses. I cannot be positive what other Mixtures there were; for it was nine Years ago, and I was little at Home while it was a-doing; but it was sown with Wheat, and I had a very good Increase. I was sensible, however, it had not got sufficient Manure, therefore I laid it down the next Year with Barley and Rye-grass. The Crop of Barley was tolerable, and afterwards the Rye-grass was very good for two Years. I made Hay of it the first Year, and it hath been pastured ever since: But I soon found out that I had guessed too well, that it had not got Manure enough, to overcome either the Hungriness of the Soil, or the Trumpery of Broom, Whins and Weeds,

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that grew upon it; yet I could not want the Fields, having no other Grounds fenced: So that I had but little Profit. However, the Wheat, the Barley, and the first Year's Hay, more than repaid my Costs; and the Ground, though little worth, is twice as good as it was before I began to it.

I had, about two Years ago, a Gentleman here who hath good Skill of Husbandry; and I asked his Advice about one of these Inclosures which I thought worst. Having told him I did not incline to plow it up, because, though I had got some additional Inclosures, yet I had not enough; his Advice was, to lay about ten Cartfuls of slaked Lime upon the Acre of it, and that he had heard it would not only destroy the Whins, &c. but would mend the Grass so much, that it would be the earliest Hay the next Year. I mowed down the Bushes, burnt them, spread the Ashes; then I laid down the Lime as directed: But, when the Spring came on, (for the Lime was laid on in *October* and *November*) there was so small Appearance of Hay, that little Grass was to be seen. However, some Horses were put into the Inclosure, and they grew very fat; but the Bushes grew strongly. I could not get Lime of my own, nor could I get any more to buy than what was laid upon the half of the Field. Upon the other half of it I laid some Pigeon-dung; and I made an Experiment of Clay, which I shall have Occasion to mention afterwards.

I plowed up the whole Field, and sowed it last Spring with Oats; and indeed I had both good Oats and good Straw. Now, I would beg your Advice, what I shall do with it next. The Field, as I have told you, is twelve Acres: It is not plowed this Season yet; but I have Strength enough to do it in a few Days. The Whins are rising very fast.

Before I go further, I shall let you know the Soil: A great Part of it is a sandy Channel or Gravel;

vel; other Parts of it are a reddish, spouty Sand; the rest of it is a cold Clay. I shall next inform you what Kinds of Manure I have: First, I have a Kind of Sea-clay, that I may have for the fetching a quarter of a Mile. By the Sea-clay I mean, a hollow Ground that is Clay, upon which at every Spring-tide the Sea comes, and cannot get off again, but sinks into the Ground: It was that which I told you I had tried, and where it was laid the Oats grew five Feet high. I have Sea-sand, at about the same Distance as the Clay; but our Sand is not a shelly Sand. I have a Dung-hill of Earth, Horse-dung, Coal-ashes, S. S. S. which I have been collecting these nine Months, and is nearer the Field than any of the other Manures.

The Farmers here have been asked, what Method I should follow? and they say, that Part of the Inclosure that was limed will carry a Crop of Barley with one Furrow; but that the rest will require more Labour and more Dressing. I am at a loss what to do: But I shall tell you one or two Ways that I myself am inclined to, with Submission to your better Judgment; for, tho' I be but a young Farmer, I am weary of the Way that is used by my Brother Farmers, and shall be very ready to follow Advice, when I think it carries Reason with it; and the little Piece that hath been set out by your Order, hath so much convinced me of the Skill and good Intentions of the Honourable Society, that I hope you will continue to do all the Good you can to the Country.

The Method I propose is this; first to plow up this Field immediately, then to lay upon the clay Ground Sea-sand, but how much is proper for an Acre I don't know: Upon the sandy Ground to lay on the Sea-clay; and, where the Ground is gravelly and thin, to lay on the Dung-hill, that is
made

made of Earth, Horse-dung, &c. which will make an Addition to the Thickness of the Soil.

I know not, if plowing the Land just now, laying on the Manure, and giving only a Seed-furrow, will do; or, if it must have three Furs, as is the common Way. I would sow this Ground with Barley, and the broad Clover; reap the Crop of Barley; the Year afterwards, take what Crops of Clover I can, and carry the Hay out of that Inclosure to the other, of twelve Acres, that is just next it. It hath been these twelve Years in Pasture, and the Whins, &c. mowed these two Years twice a-year: It hath been well fed; for I have had young Horses upon it Summer and Winter; in Winter Hay hath been given them in Racks, and they have been removed from Place to Place; but having now got some other Places for them, I incline to give the Hay to black Cattle; and by that Means to get the Ground equally dunged.

This, I hope, will enrich the Ground that is in Pasture, and make it fit for Corn, while the other Inclosure that I take the Hay off is to suffer nothing; since the Way I propose to use it, is after a Method I am told is just now much practised in *England*, viz. When they have got one Year of the Clover, and taken as many Crops as they can, they let it stand the second Year till it is in full Blossom; then they roll it with a wooden Roller, and plow it down: This I suppose will happen in the End of *May*, or Beginning of *June*. They take care that it is perfectly covered with the Furrow. At Wheat-seed Time they plow it again; and by that Means they say it is so well rotten that they sow Wheat, and expect a great Crop. I think this would be a very good Way of using my Ground; because, the often cutting of the
Clover,

Clover, and the plowing it down will not give the Whins, &c. leave to make any great Advance.

The other Way I was thinking of is, to give the Manure I proposed, but instead of Barley, to sow it with Pease; after the Pease, to sow Wheat, thinking the Dressing I incline to give it, and the Pease, may make it strong enough for Wheat. I confess the first Way pleases me best; because I can the sooner get a Quantity of Grass to bring in the other Inclosure, and not be at the Expence of Carriage, which, I am sure, whatever my Brother Farmers think, is the Thing that costs most.

I am laying out some Ground for Turnips, according to your Directions: I would ask one Question upon this Head, *viz.* Will manuring the Ground with Sea-ware have the same Effect that Dung will have? If this Correspondence is not troublesome, you shall have more of it from one who wishes you all Success.

The Society's Answers.

THO' you are pleased to conceal your Name, which it is not our Business to enquire into, yet you have discovered, by the distinct Account you give us of the Ground, with respect to which you desire our Advice, and of the Method of Management you have hitherto used, and incline to proceed in, that you are not a Stranger to that Science, in which we are very desirous to be helpful to others; and tho' we should think ourselves very happy, in having your Assistance in resolving Questions of this Nature, sent us from Persons of less Knowledge in these Matters, yet we will not decline laying our Opinion upon this Case before you.

The Ground bearing a short Heath, upon a Soil, whereof part is gravelly, part Sand, and part Clay,
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the natural Disposition of such Grounds being either to return to Heath again, or Whins, Broom, or such Trumpery, there is a Necessity, either to continue them, after their first breaking up, in Tillage and good Manuring for several Years together, in order to reduce the Soil to a natural Sweetness, and dissipate those malignant Qualities that occasioned the Heath, &c. by Expositions to the Sun, Rains and Frosts; or else, to break it up in such a Manner as will, by the more violent Influence of Fire, reduce it more speedily to a healthful State: So that, had this Ground at first been denshired, and only one Crop taken, after Preparation with the Manurings of Sand and Clay applied to the different Soils, as mentioned in your Letter*, there is no Reason to believe that you would have been put to a Repetition of your Labour.

But we must now look forward, and shall take the Ground as in its present State, and lay before you our Advice, with respect to the proper Method of managing it, either for Corn, or with Grass, to Advantage.

It is with Manures as with Medicines; some alter the Habit or Disposition of the Body to which they are applied; others only prompt and assist Nature in the Way she herself points out. Nourishing Food is very good for a low and weak Constitution, not labouring under a chronical Distemper, which would be a bad Practice was it acute, and where there are visible Symptoms of a disordered Habit; for thereby the Distemper would be fed, and sooner pushed to a Crisis, whereof the Effects might be fatal. It is just for with Soils; where they are poor, and produce little, Dung, Lime, and other Manures, may have a good Effect; but where the Soil appears de-
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* It was supposed to be wrote by the Earl of Haddington.

ved and corrupt, by its producing Whins and other Trumpery, the Application of Manure, in that Case, only strengthens and forwards their Growth; so that something is first to be done for correcting these bad Qualities, before the Manure be applied, in order to make it more fertile in a better Crop; and thus the liming of the Inclosure, mentioned in your Letter, was rather a feeding of the Disease it laboured under, than a Cure.

It is proper also to consider the different Natures of Manures; for it is obvious, that the Dung of Horses is not proper for sandy Grounds, being too hot, as may be observed from these Fields when they rathe upon them in Summer; where, in place of throwing up a fresh tender Grass, as it does on Clay Grounds, it commonly burns up all under and about it; whereas, the rathing of Cows has the same Effect upon sandy Pastures, that Horse-dung has upon Clay Grounds, in bringing up good Grass.

The Sea-clay mentioned in your Letter is certainly a very proper Manure for that Part of the Inclosure you applied it to; but in regard that, by the Situation of the Place from which you took it, it appears to be for most part covered with Water, whereby it must be impregnate with many undesirable Qualities, from its want of a due Exposition to the Sun and Air, to digest the Salt it receives from the Tides into a proper Disposition for Vegetation, it will be necessary to have it rightly prepared before it be applied as a Manure; and we are of Opinion, that the best Way to do it is to make it up into great Heaps, with a Mixture of Lime sufficient to break the Viscidity of the Clay, and a good Proportion of Cow and Horse Dung, S. S. S.

After it has lien in this Manner for the Space of three or four Weeks, or upwatds, let it be delved over from Top to Bottom, in the Manner that
Ground

Ground is trenched, and raised into a Heap, at least four or five Feet high, the higher and larger the better : Then it will heat like a Garden-Hot-bed, and by the Fermentation be reduced to a small fat Mould. If this first Heat should go off (which you will easily know by thrusting a Pole into it) before it has produced this Effect, it may be turned over again as formerly, and it will take a new Heat, which is a very great Advantage to it, besides the better mixing of the Manures : Then it will make an excellent Compost for the gravelly and sandy Part of the Inclosure, if dunged with it, at the Rate of fifty or sixty Cartfuls *per* Acre.

If the like Method be taken with the same Sea Clay, mixed with Horse Dung, your Coal Ashes in place of Cow Dung, and double the Quantity of Lime prescribed, and be turned and managed in the same Manner as above, it may be applied to the Clay Part of the Inclosure with Success; or, as you say, Sea Sand for the Clay Soil, in place of the Sea Clay, or Part of both may be used; for your Sand, though it has no Shells in it, will do Service to the Clay Ground, by the Salts that it will carry along, otherwise than by rendering it more free and loose.

Of this the Farmers below *Dumfries*, and others upon that Coast, have certain Experience; and they apply it even to their light, hazely, or sandy Soils, with Success. Indeed they chuse to have Mud with the Sand, and this they call *Sletch*; yet we believe Shells, which are a more durable Manure, would more effectually correct the four, steril Juices of your cold Clay, being of their own Nature an Alkali, which is a direct Opposite to Acids.

Having detained you long upon the Nature of Manures, and their different Preparations, we shall proceed to give our Opinion as to the Management

ment of the Ground: But the Method we have laid down to ourselves, of booking Queries sent to us, and the Answers made thereto, that others less knowing may have the Benefit of them, obliging us to be the more particular, we hope you will not grudge the reading of what we write, chiefly for the Instruction of others. If you find any Thing amiss in it, we hope you'll have the Goodness to communicate it to us.

Altho' the Oats that grew upon your Ground last Year were so very good, yet since the Whins continue to prevail, it is proposed that it be deep plowed with a sharp winged or feathered Sock, and a very sharp, well steel'd Coulter, to cut the Roots of all Whins, Broom, or other Trumpery. In *April*, plow it cross with Irons in like trim, and break the Clods with Harrows, or as you best can. In the Beginning of *June*, plow with a small narrow Furrow, sow Turnips, and hoe and spend them as directed in the Answers to the Lord *Kilkerran's* Queries, P. 5. or Sir *Archibald Grant's*, P. 19. There different Ways are proposed; we leave it to you to determine which is best, and to follow that: But which soever of them you take, it must contribute much to the Destruction of your Whins and Broom, and the Horse-hoeing Method will do it most.

If you incline to have Grass without Loss of Time from this Inclosure, take the first Part of the Barley Season; and the Ground being well plowed, sow Barley and Clover, with a small Mixture of Rye-grass. The quick growing and Rankness of the Clover, and the cutting of it, will greatly discourage, if not totally destroy the Trumpery. Such of it as, struggling, overcomes, may be taken out Root and Branch, the Rules offered in the Answers to the Lord *Ross's* Queries, P. 107. being observed. However, this will be a yearly
S Work;

Work ; for Whins, Broom, &c from latent Seeds, will often be setting up their Heads, even while the Ground lies in Grass, and when plowed they may happen to grow nigh as thick as ever : Wherefore, since Plowing causes their Seeds to vegetate, and also destroys the Plants, it is evident, that, to get quit of the very Seeds, at least of the greatest Part of them, there can be no Expedient fallen upon better than frequent Plowings ; and if you manure at the same time, the more of the Seeds will grow, and the more Opportunities you have to destroy : So, since we believe you will be satisfied to make as sure Work as possible, we are of Opinion, that, rather than to sow the Barley, and lay the Ground so soon down to Grass, you should go on with your Plowings, and before Wheat-seed Time lay on your compost Middings prescribed, (for preparing of which you have two Summers and a Winter) then give a Seed fur, and sow Wheat. After the Wheat is cut, plow the Ground immediately ; water-fur it well, and let it ly so all Winter. In the End of *February*, or Beginning of *March*, harrow it ; sow Pease, and plow them down with a light Fur. When the Pease are reaped, plow again ; water-fur it, and, after one or two Plowings in the Spring, as you shall judge necessary, sow Barley with Grass-seeds as directed.

We have studied this Course of Husbandry, and Manner of Cropping, to answer the End proposed ; for it is to be remarked, that where Whins and other Trumpery are to be extirpate, which is best effectuate, by first tempting them to grow, and then plowing them down and rotting them, such Grains are to be sowed as require the most frequent Plowings ; or, if you find your Ground not strong enough for Wheat, as in the Case, that thro' any Accident, you have not the Middings fully prepared, or want to employ them to some other Purpose,

Purpose, then you may sow Pease under Furrow after your Turnips; and, because both these two Crops are Enrichers, you may sow Barley with Grass-seeds, as advised in the first Case.

As to your Query concerning the Fitness of Sea Ware for Ground upon which Turnips are to be sowed, though it be an excellent Manure, as Mr. *Scot* of *Scotstarvet* has shown, P. 126. yet the greatest Advantage by it depends upon the Prudence of the Management; and we are of Opinion, that it is not so profitable, when laid on immediately before the Turnips are to be sown, as when so much sooner, that it may have Time to dissolve, incorporate with, and communicate its good Effects to the Earth before they be sown; for tho' in this Method it will be of the shorter Continuance, yet a large Crop of Turnips will make more than amends, by the Value of themselves, and the greater Good they will do to the Ground, by their own Nature, and the Dung and Urine of the Cattle that eat them.

Before we conclude, we incline to mention the Method used in some Parts of the County of *Surrey*, where the Ground is sandy and gravelly. When it is broke up out of ley, it is plowed after Harvest, with a deep strong Furrow; then it is dressed by three successive Plowings in Manner described, and sown with Turnips. The Turnips are ate in Winter by their Sheep or Cows; next Spring it is sown with Barley; the third Year with Pease. After the Removal of this Crop, it is manured with a Midding they have prepared, and compounded of the Dung of their pasturing Cattle, which they carefully gather once a-Week, and make up into Heaps, with the Scourings of their Ditches, and other Ingredients. This they sow with Wheat, after which they take a Crop of Barley sowed with Grass Seeds, which, after cutting
the

the first Crop, they pasture for four Years; and then plow and crop in the same Way: But our Grounds not being commonly in so good Heart as theirs are, we advise, after the Pease, in place of Wheat, to sow Barley and the Grass Seeds.

You will perceive, that what we have said may be easily applied to the Management of the other Inclosure, from which you may expect two good Crops, after being so long pastured, before you begin to follow this Method.

If you incline to take the Method you yourself propose for the first Inclosure, we doubt not but you will have a very good Return after two Plowings, though it will not cure the Disease, but rather cherish the Whins and Broom, and tempt them to rise. Indeed your Design, of taking only one Year's Crop of the Clover, and tilling down the second Year's, when it is in full Bloom, for a dunging, by which Means you get also a Fallow, bears a great deal of Reason, and thereby the Whins will be so discouraged, that they could not do much Harm; yet still *latet anguis in herba*, and they will be taking Nourishment from your Ground.

You'll please observe, that where this Method is followed in *England*, it is upon Ground that has been under good Tillage and a Course of Dungings; whereas, for some Years, your's must struggle with its own bad Qualities, and even be overcome by them, sooner than richer Fields already brought in. You see, tho' it is of a great deal more Value than it was, how soon it would return to its own Nature and former State: Wherefore we advise, at once to extirpate the noxious Weeds or Trumpery; not expecting even then, and after all we propose, that the Soil shall become good at once: No, that, like all other good Things, comes by Degrees, though the Weeds sometimes, when we
think

think we are pretty much out of the Hazard of them, surprise us, like other Mischiefs.

We are sensible we have been more particular than we needed; but we hope you will admit of the Reason we have mentioned, and desire you will communicate to us such Discoveries as, in the extensive Course of your Experience, you must have made.

A Letter from the Right Honourable the Lord REAY, to Mr. HOPE of Rankeilor.

S I R,

I Have some good Ground in this Country, where-
of Part is in my own Hand, which I think might be much better improved than hitherto it is; tho' by the present Management, it is thought as profitable as any so-much in these Parts.

I shall begin with giving you an Account of the present Method of labouring, and then, how I think it may be amended.

The Ground lyes low, on a large Bay, and an Arm of the Sea, to the East of *Farohead*, the most Northerly Point of this Island. The Soil on one Side is a fine black Mould; the Bottom mostly a bastard Marble, and Lime-stone, through all the arable and Grass Ground in this Parish: On the East Side the Soil is sandy; some of it is black, and has a greater Mixture of good Earth; but the most Part is a deep white Sand: Both, when ley, yield excellent Grass for Cattle, and some for Hay, which is mixed with Clover, and grows pretty high and thick in the black Sand. The Method of labouring the best Land, divided into two equal Parts, is: We sow Barley in the one, and black Oats in the other, by Turns. The Dung we use for Barley, is Sea-ware, Horse and Cow Dung; or Dunghills
of

of proper Earth and Sea-ware, made in Summer, and laid on the Ground in the Spring before it is tilled. This is generally the Practice, both on this Coast, and that of *Caithness*. Our common arable Grounds yield generally of Increase from seven to eight of Bear, and from five to six of Oats. As for the sandy Soils, of which I have some large Inclosures, chiefly designed for feeding black Cattle, I labour an equal Quantity of them yearly: The Method of doing it is thus: I till the ley Ground about three Inches deep, with a small close Furrow, in the Beginning of *November*; and thereafter cover it with Sea-ware as soon as I can. I till it a second Time in the End of *April*, and sow it with Barley: It is the first ripe Corn, and yields generally from fourteen to sixteen of Increase.

The next Year, I till it only once in *April*, and it yields from ten to fourteen, if the Season is not too dry. The third and last Crop is Oats, which is but indifferent in the white Sand, but very good in the black, of which, some would allow to be laboured a longer Time, as our best Land. After the third Crop, the Tenants let their Land ly out for Grass three or four Years; but I continue it seven or eight Years ley, till it fogs, having always the same Quantity taken in and left out.

In most Parts of this Parish, there is plenty of Marl of several Sorts, and Lime stone in the Middle of the Moss, where our Firing is cut. Our Neighbours in *Caithness* make much Gain by Marl, but not on sandy Ground. I am of Opinion, that Lime and Marl separately or jointly, may keep in our Ground longer than the Sea-ware; and that the Dunghills will do better, by mixing them with Earth. I have some Thoughts of sowing Grass Seeds to increase my Hay, of which I have no great Quantity. Please acquaint me, whether a Mixture of Clover and Rye-grass, or either separately, would do

do best? What is the Quantity to an Acre? and how to win the Seed of the Rye-grass. I judge that of Clover will not do with us. I am told, that these Seeds do more Harm than Good, where the Soil produces Rye Grass naturally, which is the Case of my Inclosures; but of this I have no Knowledge or Experience. As I design to try some Grass-seeds this Season, acquaint me where they are to be sold at *Edinburgh*? and how? Some Gentlemen in *Gaithness*, who have tried Fallowing of Ground, and others in *Ross* tell me, that it does not turn to account with them.

I expect you will give me your Opinion and Advice anent these Things, since it is not worth while to trouble the Society with them.

RANKELOR's Answer.

MY LORD,

I Had the Honour of your's, describing your Soils, present Management of them, and the Produce they yield. The last, being so great, speaks in favour of the other two; yet, if a Summer-fallow, Pease or Turnips, were always interjected betwixt your Barley and Oats, the good Effects of any of them would evidently appear in making your Returns still greater, unless the Soils in your Country differ from all like them where Fallow has been used, or such meliorating Crops taken with Judgment. Truly, seeing you have Marl of several Sorts, such Plenty of Lime, Sea-ware, and Earth proper to compound with them in Middings, for further enriching your Ground, that seems to be so very rich naturally, I can see no Reason why, with such Assistance, and a judicious Variation of your Crops, you may not, if you please, bring them every Year after the Plow from all your arable Grounds.

To make a less Extent serve for Grass, each
Acre

Acre laid down in Heart with Clover, and a small Quantity of Rye-grass, could not well miss, whatever People, without proper Trials and Experience, may tell you, to feed as many Cattle, and as well or better than three or four does, according to your present Method. You will find Directions concerning the Quantity of Grass-seeds proper for each Acre, the Manner of preparing the Ground, and sowing them, in the Book formerly published by Order of the Society; or you may sow a less Quantity, suitable to the Rules, and for the Reasons offered by Mr. *Maxwell*, P. 46. You may get the Seeds from Mr. *Eagle*, our Seedsmen.

I am afraid it would be in vain for your Lordship to attempt to save Clover-seed so far North; since, in the most Southerly Parts of *Scotland*, the Sun has rather too small Influence to ripen them: But you may keep yourself in Rye-grass, by sowing a little of it yearly by itself. You may know when it is ripe, by beating some of the Heads of it upon your Hat in a dry Day: If they come out, it is then Time to mow it; and after the Grass is dried, cause thresh out the Seed in the Field, upon Boards, laid upon a large Canvas or two, which being cleaned, in the same Manner as Corn, lay by on a dry Loft, or Dale-floor, for Use.

These Gentlemen in *Caithness* and *Ross*, who say, they never found Good in fallowing, have certainly marred it in the Execution: For, let their Grounds be never so weak or strong, they must, if orderly and sufficiently done, find the good Effects of it: It is surprising, that they find no Good in marling their sandy Grounds; when every body here, and every where but with them, finds the most Advantage by it on that Soil. If your Lordship would prevail with them to send up an Account to the Society of their Method, and their Reasons against Summer-fallowing of their Grounds,
and

and marling their sandy Soils, it would be very obliging; that so we might convince them of some Error, or be convinced by them, that their present Practice is right.

As I have partly said before, I think it better to make compost Middings of your Lime, Marl, Sea-ware, Earth, and what Dung you have, than to lay on these Manures separately; because, being compounded, their different Natures and Qualities struggling with one another, will make a great Ferment: When fermented, turn them by the Spade and Shovel, or you may take the Assistance of a Plough; and first scatter them, and then gather them into great Heaps, which will occasion a new Fermentation, and enrich the Mass; and besides, there will be an Addition of good Earth to your Ground, which will make it continue the longer in heart. These, my Lord, are my humble Thoughts, and I wish you may find Use in any Thing I have said. If in any Case you think the Opinion of the Society can be of Service to you, it will be very agreeable, I am sure, to all our Number, if you, who write so pointedly and distinctly, shall be pleased to use your Pen.

*MEMORIAL and QUERIES by the
Right Honourable the Lord Reay.*

THE Lord Reay is now inclosing a large Meadow, which lies in a level Bottom betwixt high Hills, having a small Rivulet running through it, which often overflows it three or four Feet deep, when the Snow melts in Winter, or when there are great Rains. He hopes to be able to prevent the Overflow, and to command the Water for flooding, and so enriching the Ground on proper Occasions. The Soil is about one Foot deep

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of brownish Moss, under which there are sixteen or eighteen Inches of Clay mixed with Sand, and a whitish Sand at Bottom. When digged three Feet deep, Water rises in the Ditch. This has hitherto been a Common. It gives plenty of rough, four Grass, and, if kept, he is persuaded it would yield a Kind of coarse Hay. The Banks of the little River bear a kindly Grass, occasioned by the Sand or Mud, which, when high, it throws up there. His Design is to get this Meadow to yield good Hay. The Surface is tough and strong, and was once full of Allars and Sallows, whereof some still remain. He judges, that, if it was pared, burnt, the Ashes with some Lime spread over it, and then plowed so deep that the Moss and Clay were mixed, it would yield a Crop or two of Corn, and then be fit to be sown with Grass-seeds, in order to give Grass fit for Hay: As he is a Stranger to such Improvements, he expects the Society's Advice, with proper Directions. They deal only in Bear and Oats in these Countries; yet he doubts not but Wheat would grow in several Places, of which he is making a Trial:

The Society's Answers.

WE are of Opinion, that the Meadow you describe is capable of great Improvement, if you can fully carry off all stagnating Water, and prevent any Overflow, except when you think proper: These being supposed, first drain it to the full, because upon its being perfectly drained the Success of your further Improvement depends; and in the mean time, you may be taking out the Roots of the Allars and Sallows. All which being done, cause Men, with Turf-spades, pare off the whole Surface, unless your Horse-plough, which ought to have a Sock with a Wing or Feather

at it, for the better cutting of the mossy Turf, can take off the Surface at only four or five Inches of Deepness; because it will be profitable to save the Remainder of your Moss, to mix with, and assist the Separation of the bound Particles of the Clay.

Having given Directions for burning of the Turf, the Quantity of Lime to be given, and the spreading of the Ashes and Lime, *p.* 98. a Repetition would be needless and troublesome; we therefore pass forward, and advise you to plow up two or three Inches of your Clay, that, by the harrowing, the Lime, the Ashes, the Moss, and the Clay being all mixed, the Difference of their Natures and Qualities may occasion the greater Ferment, and thereby the Pulveration of your Moss and Clay, which will help to separate the Parts of one another; and being so fermented, separated and mixed, will become a very proper Nourishment for Plants of all Kinds, which are not the Offspring of a much hotter Climate than your's.

In so Northerly a Situation, you ought to sow early, that the Plants may have Strength to withstand Winter-storms. Therefore, if your Ground be prepared, you may sow Rape about the 10th of *August*, or Wheat betwixt and the End of the Month. Whether sown or not, the Ground ought to be well water-furred, that it may ly as dry through the Winter as possible. In the proper Seasons in the Spring, plow up such Parts as were not so employed, a small Degree deeper than at first, that so you may raise all the Lime and Ashes; then sow Barley or Oats as you think proper.

Avoid sowing Wheat after Wheat, Barley after Barley, or Oats after Oats, or any of these after any one of them; for Pease, or some other meliorating Crop, should be always interjected. Grass-seeds are to be sown along with the Barley or Oats, and among the Brier of the Wheat, in *April*, in a calm,

calm, moist Day*; These small Seeds will find out proper Lodgings for themselves among the Mould, and the young Wheat will defend against the withering of the Wind, or scorching of the Sun.

We had almost forgot to tell you, that three Fifths of the ordinary Allowance of Grain, and five or six Lippies of Rape-seed to the Acre will be sufficient, in consideration of the Heart the Ground must be in for the first Crop; and to take a second, and that of Grain, and therewith to sow Clover and Rye-grass.

If you can make a Dam at the lowest Part, which will stop the Water until it overflow the Field, put a Sluice in it; and after the Ground is laid down in Grass, work the Water upon it as directed in the Answers to Mr. *Bethune's* Queries, p. 103. which will serve the Ends therein mentioned.

The Cleanings of your Ditches, compounded in Middings, with Lime or a little Dung, or both, and spread about *October* upon the weaker Parts, will wash into the Roots of the Grass with the Winter-rains, and make it thrive.

A Letter from Mr. Fullarton of Gallarie, directed to Mr. Hope of Rankeillor.

S I R,

MR. *Scot of Duninald* tells me, that you, and the rest of the Members of your laudable Society, desire every body to communicate to you what they think may be useful. It is what ought to be done; for though you may be thereby incumbered with Heaps of Lumber, yet your better Judgments will, out of much Trash, select some useful Materials to raise Advantages to your Country. On this Encouragement, I send you my Mite on the following Subjects.

I. Fen-

* Grass from Grass-seeds sown among Wheat in *April*, does not thrive so well as when sown with Spring Corn.

1. Fencing of Land.
2. Killing Rats that infest Corn-lofts.
3. Curing smoky Chimneys.
4. Making Coppers boil with much less than half the Fire commonly used.

As to the *first*: I was near twenty Years a Farmer in *England*. I have been now ten a Farmer in *Scotland*. The Methods of fencing I practised in *Hampshire* and *Essex* would not do here. The Beasts, (for five Years), ate up and trode down Inclosures I made of all Sorts of Trees and Bushes. I had no Stones, and Bricks were dear for want of Fire. Furz did not thrive in my Land, and the Winter killed them. At last I observed, that nothing ate up or destroyed the Sweet-briar or Eglantine Plants. So I set to work, gathered the Hips, and laid them in a Tub till *March*; then the Seeds rubbed easily out, and I sowed them in Ground prepared for Garden-pease, (which I did not furrow), so I got my Crop of Pease without Prejudice to my Briars, which came up the next Year; and the Year after, I planted them, as they came to be a Foot high, in this Manner:

I rooted out my Ditch, and laid my Plants upon the Grass, under the first Feal of the Dike, with the Tops out to the Ditch, at about eighteen Inches Distance. I laid the Earth-side of the Feal on the Roots of the Briars; so, when the Dike and Ditch are made, the Briars stand out towards the Ditch at the Foundation of the Dike: They, in four or five Years, make a Fence, that no Sheep, black Cattle or Horses, can pass. I shewed Mr. *Scot* Fences of one, of two, and of four Years planting. If you have old Briars, you may dig them up and divide them, and they make excellent Plants. Where the Fences are thin, you may easily thicken them, by laying down Branches; for they will make Shoots of six or seven Feet in a Year.

They

They bear clipping very well, I hope they will never decay ; for I observe new Shoots rise faster than the old die. But I have not been long enough here to warrant their Duration ; only I observe Sweet-brier Bushes that seem to be of very long standing. I now make six Yards, of what I expect will be a good Fence in four or five Years, for Sixpence. But, in my sandy Land, I dare seldom, at once, raise up my Dike ; so I am forced to raise it by Halves, and to make half my Ditch the first Year ; and next Year, when it is settled and swaired a little, I make it up to the designed Height. Mean time nothing troubles my Briars ; and, in two or three Years after they are planted, nothing can pass the Fence. Sheep sometimes attempt it ; but then they are entangled, and would ly till they die if they were not cut out. I have been tedious on this Article ; but I am fond of it. I wish *Scotland* were inclosed, we might then labour as they do in *England*.

As to the *second* Article : My Corn-loft is but one Foot and ten Inches upright Wall above the Floor. This Wall I plaistered smoothly with Lime ; and, from the Top of the Wall, I lined two Feet up all around with thin well-smoothed slit Deals ; on the upper Side of which, I nailed a Ledge three Inches broad, jetting over : So the Rats got easily down from the Balks and Roofing of the House, but could not get up again. I slip in a Dog at the Door, who soon kills them all, sometimes forty or fifty at a Time. They are now grown cunning ; and, altho' the Coach-house and Stable Lofts have a Communication with one another, and with the Granary, and swarm with Rats, yet it is rare that any venture down : Sometimes two or three young, foolish Rats, or some Mice take their Hazard. I opened a Passage in the Lining, and made a Contrivance to shut it before I let in the Dog ;
and

and by that Means I get a Hale. It is incredible how many Ways they had at first to escape the Dog, but I prevented them all. A little Expence makes this Contrivance.

As to the *third*: All the Chimneys in my House, except one, smoked when I came here; and now they all vent well. I found no Remedy by Stove-chimneys, or by *Desagulier's* Gimcrack; but, by several Ways of setting the Grates, breaking up the Backs and Vents, and making a proper Hole in the Top of the Chimney, as I observed the Wind affected the Smoke, I cured them all. The Methods were so various, I cannot describe them. I shall only explain how to help these that smoke, when the Wind blows from the North, North-west, and North east.

Make a Box of Deals, open at both Ends, about two, or two and a half Feet long, just to fit the Vent in the Chimney-head; into which one End of the Box is to be fixed, and to stand up eighteen Inches, or more. I made the upper End a little narrower than that End which is fixed into the Chimney. Before I put up the Box, I cut in one Side a square Hole, about seven Inches long, and five or six wide. I fixed a Board slanting down from the upper End of the Hole towards the lower, at an Angle (as I guess) of forty-five Degrees. I nailed on each Side of this Board Bits of Boards to fit the Angles. This Box I fixed in the Top of the Chimney, placing the Side with the Hole to the Leeward. This simple Contrivance, after many more troublesome Experiments tried in vain, has cured my Chimneys, and several other Peoples.

Nota, It was advised to make the following Addition to the foregoing Direction. *Where there happens to be a Swirl, the Pillars at the four Corners, to which the Box is nailed, ought to be carried up about six or seven Inches higher than the Box; and, these*
Pillars

Pillars being covered with a Board, the Smoke vents freely between them.

Fourthly, To make a Copper boil with half the Fire commonly required. Some that have weighed the Coals assure me, that less than a Third will serve. The Fire plays all around the Copper, which is built about with Bricks, hangs just four Inches clear within them; and is supported by a Circle of pinning Bricks, that go round under the Brim, and a Semicircle of pinning Bricks that go half round, about ten Inches above the Bottom of the Copper, in the Fore-side. There is a Vent-hole, that comes out just above the Pinning that goes half round the Copper; which Vent is carried up close within the Wall, till it comes into some Chimney, or goes out at the Top of the House. There is an Ash-pit, as for other Coppers, over which there are Bars of Iron laid, for a Grate to burn the Fire upon. Between the Grating and the Bottom of the Copper is eighteen Inches; between the first Pinning, that goes all around near the Brim of the Copper, and the second Pinning, that goes half round, below that, on the Fore-side, is ten Inches.

The pinning Bricks should be made angling, to join to the Copper and the Wall, to support the Copper; but not having any such, I cut them angling. The Outside of the Copper is built all around firmly with Bricks, up as high as the Top of the Copper.

I hope you will understand my Meaning; you have all the Description that I had from the Gentleman that explained it to me at *London*, and what I have learned by setting my own Copper, which boils something more than a Hoghead. The Person that invented this has a Patent, that none shall use it without his Consent in *Barbadoes*, where it is constantly used with great Success.

Altho'

Altho' several Circumstances in the above Matters seem trifling, yet in the Practice I have found them all of Consequence, and effectual.

I am, &c.

A Letter from (the late) Mr. Lockhart of Carnwath, to Mr. Hope of Rankeilor.

S I R,

IN compliance with your Desire, I send you an Account of the Method I followed last Year in preparing my Seed-wheat. I got it from a Gentleman at *Brussels*, who had it from one in *Normandy*, that kept a great Part of his Estate in his own Management, and was reckoned an Artist in Agriculture, he recommended this Method as what he constantly followed, and as attended with Success in all Sorts of Grain. I made the Experiment last Year; and, whether from this, or what other Cause, I shall not say, but so it was, that I never had such Wheat in this Place: Mr. *Brigs* said, he thought it better than your's, tho', sure I am, the Soil is not near so good, nor was it so well prepared. The Inclosure had been six or seven Years in Grass, had carried first a Crop of Oats, next of Pease, and, without any fallowing, or Dung, this Crop of Wheat. So far by way of Introduction; next comes the Receipt:

TAKE as much Water as will fully cover the Quantity of Grain you intend to use: Add thereto a reasonable Quantity of a Mixture of Horse, Cow, and such other Dung, as you can conveniently get, so as not to make the Water too thick: Add likewise, for every Boll you are to steep, about a Peck, or sixteenth Part of such Sort of Grain. Boil all these till the Grain is reduced

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to

to a Musk; and keep the Kettle or Caldron covered. Next, drain off the Water; and, while it is lukewarm, infuse your Grain for three Days, as my Author directed me: But I kept mine in the Liquor only half that Time; otherwise, I am sure, it would have bursted; for it swelled prodigiously. Wherefore, I imagine, that when it is steeped three Days, it must be of a Crop reaped a Year before: Whereas mine was not cut down six Weeks, and could not so well bear a long Infusion.

I had almost forgot the principal Ingredient, *viz.* a Pound of Nitre, or Saltpetre, to each Boll you infuse, which must be dissolved in the Water when it is past boiling. Mind to keep the Vessel covered, whilst it is steeping, with something to keep in the Steam. When it has been steeped so long as you intend, drain off the Water, spread the Grain on a Floor; and then mix with it about a Firlof of Sea-sand (if you are so situate as it can be come at) to each Boll of Seed: And, lastly, with Lime to dry it, as is usually done in other Cases.

My Author philosophised thus: He said it was to be demonstrated, that the Nitre had such an inherent attractive Quality, that the Salts in the Composition, and the Nitre itself, being infused into the Seed, did attract thereto the nitrous Particles mixed in the Mould, and the circumambient Air, which caused the Seed to sprout much sooner, and more vigorously than otherwise: And that it was attended with many other Benefits, which I have partly forgot, and besides were too tedious to repeat. I did indeed observe last Year, that, in five or six Weeks time, my Wheat appeared of a fresher Colour, and further advanced, than what was sown in the Neighbourhood about the same time: But I was inclined to impute this to mine being in a warm Inclosure, and the other in the open Fields.

However,

However, I will be more exact this Year: For a Tenant of mine sowed on the same Day I did; and I design to compare two or three Times a-week, and make what Observations occur to me in their Progress. I design to try this Way with Barley; and, that I may form a Judgment with more Certainty, I will sow the Ridges alternately with Seed steeped and not steeped: If you think it worth your while, I wish you would do the like; and then we will compare Notes. I was likewise told, that this Liquor poured upon Strawberry-beds, or any other Vegetable, in the Spring, when the Juices begin to rise, has great Effects.

Seven or eight Months ago, I saw a Book of Husbandry, (a Translation from the *French*), in which was this Infusion, with some small Variation of no Moment: But I have forgot where I saw the Book, or what was the Title of it. I am, &c.

The above is a most promising Receipt: For, besides the Observations in this very intelligent Gentleman's Letter, it seems reasonable to think, that nothing can be more natural for impregnating Grain than the Strength and Essence of itself. But, since Nitre is added, it is best to be cautious: For it has been found by Experience, that Salts, tho' they have the Virtues mentioned, kill or destroy the vegetative Powers, when the Application is immoderate, either with respect to the Quantity, or the Time the Grain is steeped; so that there has often been a Necessity to sow over again with the same, or some other Grain. To make the better Judgment concerning this so critical an Affair, the Nature and Condition of different Grains are carefully to be considered; but, by a Course of Observations and Experience, the most certain Knowledge and Direction are to be obtained:
Mean

Mean time, it is best to observe the Maxim, *Avoid Extremes.*

QUERIES by Alexander Cuninghame, *Esq;*
M. D. now Sir Alexander Dick of Prestonfield.

I Have a Farm, consisting of about one Hundred and fifty Acres, lying upon the gradual Ascent of a Hill, perfectly exposed to the strong West and cold North Winds. The upper Part of it, which goes to the Hill, is unequal, stony, and full of Whins; but, however, it has sufficient Pasture for a hundred Sheep. The lower Part has, for a long Tract of Years, been plowed, and sown with Wheat, Barley, Oats and Pease, of the whole Grains to the Quantity of one hundred Bolls.

The Sheep Ground abounds with many Springs of good Water; which, when there is any Sap in the Earth, keep the Furrows of the tilled Ground below moist; but, after great Falls of Rain, the Earth is much washed by the rushing down of the Water.

The Soil of the arable Land is different, though contiguous. There is found in some Places a very good blackish Mould, free of Stones, and pretty deep; in others, Channel-mixed with Clay: But, in the general, it is reckoned a cold Soil. It lies shelving, from a populous City three Miles, and from Lime six. It is contiguous to a large Common, full of Whins, Pits of Sand, and bluish Clay.

These Grounds were possessed by a Tenant, who, having a long Tack, was for several Years, at a very great Expence, bringing Street-dung and Lime to the arable Parts, in order to keep them in a tolerable Condition for constant Tillage; but his Tack being within some Years of expiring, he brought

brought no more Dung, tilled as much as ever, and generally sowed Oats; by which Means the Ground is left in an exhausted, infertile Condition.

Quæritur, What Improvements, and what Planting, are fittest for the Ground represented?

The Society's Answers.

THE Doctor's Farm lying on the cold Side of the Hill, and in time of Floods being harmed by the Springs in the higher Parts of it, he should endeavour to guard against these Inconveniencies; and, in order thereto, it seems advisable to ditch, and face up the Ditches with Stones, wherewith the upper Part of the Field abounds: But lest Floods should undermine and destroy the Ditches, he may carry an open one along the upper Part of the Field, upon the Springs, to convey them to the one or the other Extremity, and, at certain Places he may have Dams, with Sluices, for keeping the Water in a Body, for water-fattening such Parts of the Ground below as he shall think fit at any time to lay down to Grass. If the Doctor has an Opportunity, he may converse with Farmers of *Strathallan* or *Monteith*: Who, so far as we know, are more in the Practice of this watering Husbandry than any others in this Kingdom; and, from their profitable Experience, can give a very encouraging Account of it, and satisfy him, that the very Water, that was formerly so hurtful, may, by better Management, become highly beneficial.

The Ground being so much and so badly exposed, it is reasonable to make the Inclosures, into which the whole should be divided, so much the smaller; and to execute the same by double Ditches, leaving a reasonable Distance betwixt them, for two or three Rows of Trees. Firs will not miss to thrive, if they be planted young and carefully; and by their Shelter, will nurse up better
Kinds

Kinds to be planted among them, either at the same time, or rather two or three Years after. When the Firs become hurtful to the better Trees, they may be weeded out for Use, and Thorn-hedges being planted on prepared Borders upon the Banks, kept clean, and preserved from Cattle, the Inconveniencies from the Exposure, and also the Water, must both be removed in a very advantageous Manner, while at the same time the Ground is thereby, and by the inclosing, prepared for further Improvements.

The Society are of Opinion, that it is not advisable to carry Dung three Miles, and to an Ascent, seeing the necessary Expences would (they are afraid) overbalance all Returns that could be made by it; at least, they hope they shall be able, before they have done, to direct a far more profitable Scheme of Husbandry than was practised by the Farmer mentioned, requiring much less Dung, and, what may be wanted, far cheaper obtained.

To evidence which, they propose the following Methods, *viz.* To divide seventy-five Acres of the arable Ground into five Parts, fifteen thereof to be always in Summer-fallow, for which the Dung made on the Farm is all to be kept; the strongest Part thereof to be Wheat, the rest Pease; the Pease especially to be sown under Furrow, for the Reasons, and in manner directed, in the Answers to Lord Ross's Queries, P. 106. Next Year, where Pease were, sow Barley, and Pease where the Wheat was. Third Year, Pease after Barley, and Barley after the Pease. Fourth Year, Oats after Barley, and Barley after Pease. By which Method, there will always be sixty Acres in Corn, and near one half of them in Pease; which will much recover the Ground worn out by the former indiscreet Management, and make it always produce plentiful Crops while the same Husbandry is continued.

Or

Or rather divide into four, and, keeping one fourth in Summer-fallow, take only three Crops from it, neglecting the Oats, *viz.* Wheat upon the strongest, and Rye upon the weakest of the Fallow; next Year, Pease upon the whole of it; third Year, Barley: Which Method will bring the Ground into, and keep it in equal or better Plight than the former. As to the rest of the arable Ground, we propose to sow it, partly with Clover and Rye-grass, and partly with Turnip, and to augment the Number of Sheep in Proportion.

The Farm lying so near a populous City, more Advantage may be made of Sheep, if rightly managed, than by Tillage; unless the Ground can be kept in heart upon a very small Expence: To lessen which, their Dung properly applied, greatly contributes, as shall be shown.

For illustrating this, Suppose the Pasture Part was moderately stocked with good Ewes; these being kept easy and full fed, would bring forth their Lambs early; having so good Shelter among the Whins and Rocks in the upper Grounds; and, when in the Inclosures, being surrounded by Thickets of Planting; and fed with Hay and Turnips in the Winter; or, at some times, with Pease Straw, in a House built for the Purpose, with Hecks or Racks around for holding the Hay or Straw, when at Lambing, or any other Time, it may be thought proper to feed them.

As the Wool is usually computed to pay for keeping, a great Balance of free Profit might be drawn for the Lambs and Milk, besides the Advantage that might be made of the Dung and Urine of the Sheep, by carrying a *stratum* of the Sand mentioned into the Sheep-house, and laying thereupon a *stratum* of the Clay, and upon that a Covering of Lime, with Litter above all to keep them clean; for their Urine would sink into the Compost;

post; and when their Dung became troublesome or offensive to them, or began to make them dirty, the same might be removed to the Middling of Horse and Cow Dung, and would, together therewith, ferment highly, Things of so different Natures and Qualities, and of so heterogeneous Parts, being by this Management mixed.

This Method practised from the one End of the Year to the other, would raise a vast Quantity of excellent Manure, with no great Labour, and no more Out-lay of Money than for building of the House, and Purchase of the Lime. The Sand, Clay, Lime, and Sheep dung, would necessarily incorporate before they could be taken from the House to the Middling; and being laid thereon, and more Horse and Cow Dung being still superadded, the Fermentation would still be renewed and heightened.

Before the great Middling thus compounded could be carried out, and spread upon the fallow Ground, the whole would be blended through other, and dress the Land to good Purpose; while the Sheep, having Plenty without Doors, and being also house-fed on all necessary Occasions, could, in our Opinion, suffer nothing, except through the Keeper's Fault.

We know that Pet-sheep, that is, such as harbour about Doors, are generally fattest, and often bring two or three Lambs at a Time, and these earlier than other Sheep commonly do. Moreover, the Method proposed is not altogether new or singular; something like it has been practised in some Parts of this Kingdom, though not so much as in *Holland* and elsewhere; and where-ever it was, vast Quantities of excellent Manure have been obtained on a trifling Expence.

If about a Score of good Wedders were bought, before or in the Beginning of Winter, to sell among

mong the Lambs, the one would promote the Sale of the other; for some Butchers kill a good Wedder with ten or twelve Lambs, and busk the Lambs Ears [Kidneys] with his Fat.

Or, suppose the Doctor kept only Wedders, and made two Returns, *viz.* bought in the Spring, and sold in *July* or *August*, bought again about the Beginning of Winter, and sold in *March* or *April*: He may compute which would be most for his Advantage, and make his Choice. If he don't incline to house his Sheep in Summer, Flit-folds, or Hurdles, may be provided for laying them on the Summer-fallow, which will dung a good deal of that Ground. In either way, full Use of the Urine is got. The Country Man, to express his Opinion of the Excellency of it, when he sees an extraordinary Tuft of Corn growing, says, *The black Ewe has pished there.*

Mr. Wilson the Quaker's Letter to Mr. Hope of Rankeilor, anent planting Potatoes.

Friend Hope,

I Must beg thy Pardon for this Boldness, being a Stranger, and for the Stile of this Letter, being one of the People called Quakers.

Since I came to this City, I have read with Pleasure, the Book published by the Society here for the Improvement of Husbandry. I have of late Years followed, and been much in love with Farming; and had I had equal Success in Trade as in Husbandry, I should not have been here at present.

I have experienced a very advantageous Improvement upon waste Lands, which I find is not practised

fed here, nor much taken Notice of by any of our *English* Authors, which shall be the Subject of this Letter. It is bringing the Ground into Tillage by Potatoes. It may be done either upon wet or dry Ground, by skilfully making choice of your Kinds of Seed. There is no Ground that has the least Level to drain the Water; that can be too wet for one Sort, nor any too dry for another: The Increase is pretty equal, and both Kinds acceptable at the Table. Your wet Grounds must be planted after the *Irish* Manner, with the Spade at first, but may be plowed afterwards; though it may be something chargeable, it both answers the End well in the Crop, and saves the Trouble of paring and burning. I have planted Potatoes in wet Grounds not worth Sixpence an Acre, and have had near tenfold Increase, for two Years successively. The third Year, without any Manure, I had, on the same Grounds, as fine Garden-beans as ever I saw grow, and as large an Increase: Just now the Ground is as good as the best in the Farm, if not better.

The Book published by the Society very justly recommends fallowing every third or fourth Year; but, if you had the Method of planting Potatoes with the Plough, you needed not (especially near such a City as this, or where you can have Water-carriage) lose that Year's Crop; for the same Quantity of Dung that is usual will be sufficient, and you may have more Profit the Year you plant Potatoes than if you sowed Corn; and the Potatoe-husbandry refresheth the Ground more than such a Summer-fallow as is commonly made. I have seen as good Wheat or Barley next Year after a Crop of Potatoes, as ever I saw after fallowing, though the Ground was not extraordinary. Such a City as this would take a great Quantity in a Year, besides the Usefulness of them to the Farmer's Family; and if there was any Overplus, they might be shipped

shipped off to Countries that want them. Hogs and Poultry might be fed with the smallest, or those that in any respect were not marketable.

In good Ground, you may have after them, first a Crop of Wheat, then a Crop of Barley, after that a Crop of Oats, and then Potatoes again*: But as soon as your Wheat-crop is off, you should turn over your Ground, and not put off till Spring.

In your wet Grounds, that have been newly brought into Culture by Potatoes, if you find them strong, you may have an incredible Crop of Horse-beans, if you dibble them at proper Distances. And after a little Custom, there is as much saved in the Seed as the Labour amounts to; for it is only Childrens Work with an Overseer.

Potatoes may be preserved so as to be equally good all the Year. The Manner of which, or any other Information in my Power, is at the Service of the Society or thee. But I presume, by this Time, I have tried thy Patience, so shall conclude this Letter; and am, with the utmost Respect to thyself and the Society, thy Friend, &c.

Mr. Maxwell of Arkland's Observations upon the foregoing Letter, in a Missive to Mr. Hope of Rankeilor.

S I R,

MR. *Wilson's* Letter to you, recommending the planting of Potatoes, on account of the Advantage arising from the Potatoes themselves, and their Usefulness in preparing Ground for other Purposes, which you were pleased to communicate to the *Honourable the Society for improving in the*

* This is bad Husbandry, for an enriching Crop should always immediately follow an impoverishing.

the Knowledge of Agriculture, lies before me. I have perused it, in order to my representing what further occurs to me upon that Subject, in obedience to the Commands of the Society.

Had Mr. *Wilson*, at the same time that he sets forth the great Improvement they make upon wet as well as dry Grounds, been pleased to go further, and give an Account of the different Methods of planting them, told what Seeds are properest for dry Grounds, what for wet, and which are the best Ways of preserving them through the Winter, in the Ground, or after they are raised, it had been still more obliging; and I wish he had prevented me of any Occasion to discover my Sentiments, which (since the Society have laid their Commands on me) I shall mention, and be satisfied, if what I can say may give the least Instruction, or move you, or any other, either to correct me, or to give Information of the more proper Management of one of the most profitable and improving Roots.

Mr. *Houghton* describes the Potatoe to be a baciferous Herb, with esculent Roots, bearing winged Leaves and a bell'd Flower; and says, " That, as he has been informed, it was first brought out of *Virginia* by Sir *Walter Raleigh*, and he stopping at *Ireland*, some werè planted there, where they thrived very well, and to good Purpose: For, in their succeeding Wars, when all the Corn above Ground was destroyed, the Potatoes supported them; for the Soldiers, unless they had dug up all the Ground where they grew, and almost sifted it, could not extirpate them. From thence they were brought to *Lancashire*, where they are very numerous, and now begin to spread all over the Kingdom."

Mr. *Switzer* says, " That the Potatoe is of the *Sifer* or *Sisarum* Kind, called by some the *Sisarum Peruvianum*, or Skirrets of *Peru*, whose Nourish-

" ment

“ ment being, as it were, between Flesh and Fruit,
“ are of mighty nourishing Parts, and strengthen
“ Nature to a high Degree, having been long the
“ common Food of the *Spaniards, Italians, Indians,*
“ and many other Nations.”

They may be planted several different Ways, by the Spade, or by the Plough, and in ley or labour-ed Ground. I have seen them thrive well on that which seemed to be very bad, even in deep Moss, which could not bear Horses to plow it. This they will considerably improve; for, after the Potatoes, the Soil being pulverised by the planting and raising of them, the Moss-ground may be laid down with Grain and Grass seeds; by which, as the Potatoes and Grain will do much more than pay all Expences, Moss, that perhaps was not worth a Penny *per Acre* of Rent, may be brought, without any Charges unreimbursed, to a Meadow, probably, worth ten Shillings or upwards yearly, for the same Extent.

I have particularly observed six Kinds of them, to wit, the long red, the round red; the long white, the round white, the blue, and the Leather Coat; besides a Kind that is ready a Month or so sooner than the ordinary Sort, though planted at the same Time. I have remarked, that the blue, and long white or Kidney Potatoe, thrive better than others in Moss and wet Grounds; but especially the blue; and that it does not agree so well with dry. I have observed three Crops of Potatoes, and the like Number of good Grain got (without either fallowing, or more Dung than was laid on at first) upon coarse Heath: Of such an improving Nature are they, and so much is the Land enriched by the rotting of their Stalks among it, and the frequent Delvings; for, besides the digging that it gets at raising them, the same must be again turned over in *February, March or April;* when

when, if a sufficient Number for Seed be not discovered in the Ground, an Addition must be made: But as to this Matter, Circumspection should be used; for, when they grow too thick, the Earth cannot nourish them sufficiently. It is to be remembered, that this is the ordinary Time of planting them. However, in warm, dry Soils, they are planted with Success before Winter; and in that Case they will be the sooner ready.

In ley Ground they are commonly, in *Scotland*, planted in *Lazy-beds*, as they are called, thus: After the Ground is marked out into Beds, which cannot conveniently be much above two Yards broad, it is covered with Dung or Litter; rotten Hay, Straw, or other long Dung, is chosen, and judged as good as any Manure; in laying it on, Regard is to be had to the Strength or Weakness of the Ground; then Potatoes are laid up on the Dung, at about a Foot Distance. This done, the Planter begins to make a Ditch, (as to the Breadth of which, the Deepness of the Staple is to be considered) and cuts a moderate sized Turf, and lays upon the Verge of the Bed, with the green Side upon the Potatoes; and so goes along the Ground designed for the Ditch, always laying on the Turfs, until it be the full Breadth designed, observing to cut the Turfs smaller after a Row amongst the Outside is completed; but still laying them with the Grass Side down; then with the under Earth in the Trench the Potatoes are covered, till they be four or five Inches deep. Thus they continue till the Stems, one with another, be about half an Inch above Ground; when, with Earth from the Trench, they ought to be covered a second Time; and it will be an Advantage to them, if, when they next rise, they be again gently covered, observing always that these two last Coverings be little thicker than puts them well out of Sight.

The

The Reason for repeating the Coverings seems to be, first, That the Weeds are thereby kept down, which, though probably they might not be able to choke the Potatoes, would extract a Part of the Substance of the Dung and Earth from them. Next, by thus putting a Stop to the Growth of the Stems or Stalks for some Time, the Roots gather Strength to attract the Nourishment; so the Stems are less luxuriant, and the Potatoes rob the Weeds; whereas otherways the Weeds would rob them of the common Food of both. Thus, by their Stalks, and Cleanness from Weeds, Potatoes are judged of while under Ground: For if they be free of Weeds, and their Stems blackish, short and hard, they are thought to be large; whereas, if their Stems be long and gross, and there be many Weeds amongst them, the Potatoes are considered to be small: If People would take the Trouble to hoe them, they would find their Account in it; for as Weeds prevail, the Crop of Potatoes will fail in Proportion.

Mr. *Switzer*, in his *Practical Kitchen Gardener*, gives the Method of preparing the Seed and Planting, as he says he received it from a Gentleman of good Intelligence, who was a Husbandman that lately came from *Ireland*, and told him that it was the Way used there at that Time by the best Husbands. Mr. *Switzer*'s Words are as follows.

“ He observes upon the whole, that the Method we use in *England* of planting the Root uncut, is wrong; for that there are five or six Eyes, and perhaps more, from which the Produce of the next Year is to spring; that the Space of Ground allotted for that Bulb, or rather the great Number of Shoots and Bulbs that spring from it, is not sufficient for the Nourishment of them; and that therefore a great many of the Potatoes, that are dug up in Autumn, are small, and good for nothing. To remedy this,

(says

“ (says he) we choose a middling Root, (because
“ the largest are generally ate) and observing all
“ those Eyes that appear to be strong and vigorous,
“ we square out that Eye or Eyes, leaving a good
“ thick Piece of half an Inch to the Eye; so that
“ perhaps one Root will furnish us with three or
“ four good Plants to set.

“ Having done this, the Ground is prepared in
“ the following Manner: Let your Beds be four
“ or five Feet wide, and the Alleys between them
“ two or three more; when you have marked out
“ your Beds, you are to begin digging or trench-
“ ing them only a single Spit deep, keeping your
“ Trench open, at least two or three Feet, as you
“ do in common Garden-trenching; and having a
“ Wheel-barrow of Dung, long and short mixed
“ together, always standing by you, fill the Bot-
“ tom of the Trench therewith, upon which Dung
“ you are to place your Potatoe-eyes, as they were
“ before prepared, at about five or six Inches asun-
“ der; and when they come to grow, there will
“ be produced not above one or two Roots at
“ most, but these large and well fed.

“ To proceed, Having planted one Trench with
“ the Earth that follows in the next, and which
“ you mark out with a Line at two or three Feet
“ wide, as you do in common trenching; take that
“ Mould, and throw it over your Potatoes planted
“ upon Dung, as is above directed; and so proceed
“ from Trench to Trench whilst you are gone
“ quite through your Bed.

“ 'Tis proper for me to observe, that the Use
“ of this Dung placed at the Bottom, as I have di-
“ rected, is not only to make the Roots grow sin-
“ gle, but it has another Conveniency; and that
“ is, the making the Potatoes run, and spread
“ themselves at just such a determinate Depth,
“ which

“ which is no small Advantage to them in their
 “ growing large.

“ The last Thing to be done to them is, in *A-*
 “ *pril* or *May*, (for you plant them in *February* or
 “ *March*), as you see them begin to spring, dig the
 “ Earth out of the Alleys, as you do your Aspara-
 “ gus, and cover your Potatoe-bed about five or
 “ six Inches thicker, and this will give new Life
 “ and Vigour to the Root, will depress the Green
 “ from running too much to Haulm, and will
 “ cause the Root to grow much the larger for it.
 “ Thus you have almost double the Crop of good
 “ large Potatoes, as you would have if you were
 “ to plant them promiscuously, as we do in *Eng-*
 “ *land*. A Potatoe requires little Culture all the
 “ Year afterwards, only the pulling out some of
 “ the largest Weeds.”

For the same Reason, about *Dumfries*, they have
 near the like way of preparing their Potatoes for
 Seed: For, tho’ they do not incline to cut them
 into Pieces, unless they be very large; yet, when
 they have numerous Eyes, they cut out many of
 them. This they call gelding; and conceive, that
 they do not spring or sprout from those Places; as
 to me it is reasonable to think they do not, the se-
 minal Part being taken away.

On Stubble ground, designed for a Summer-fal-
 low, they may be planted by the Plough, and no
 Crop lost. This Husbandry will enrich the Land
 near as much as the Fallow; and the Method of
 doing it is this: Lay Dung in every fifth Furrow;
 and upon the Dung Potatoes, at only about eight In-
 ches Distance, in regard of the Largeness of the In-
 tervals. When they begin to appear, and the Rows
 are plainly discovered, take a Hoe-plough with a
 notched Muzzle, and lay an ebb Fur from the
 Rows along each Side of every Row, the nearer
 you go to it the better: When they come to be,

one with another, half an Inch, or thereby, above the Ground, take a Shovel, and with Earth from the Intervals cover them gently. Thereafter, when they appear again, and the Stems are about six Inches high, yoke your Hoe-plough a second Time, and lay a Fur as close to the Stems as you can, without covering them, or allowing the Horse to tramp on them; then lay by your Plough, for more Plowings would cut the Runners or Strings at which the Potatoes grow; but use the Hand-hoe for keeping down the Weeds, heaping up the Earth to the Stems, and pulverising it.

This is called planting in the Horse-hoeing way; and the Intervals afford them a larger Pasture in pulverised Earth, the chief Food of Plants, than they ordinarily have in the other Ways mentioned: Wherefore, it may reasonably be expected, that they will grow larger in Proportion; and the Ground in the Intervals being Horse and Hand-hoed towards them, they are thereby tempted to grow upwards to the Earth, pulverised, impregnated with the Benefits of the Atmosphere, and found in Stories one above another. To remove the Objection, of the Plough's making a Halt until the Dung and Potatoes be laid, the neighbouring Field may be reserved for plowing at the same Time.

This, to me, seems to be the best of the plowing Ways, if not of all Ways on plowed Ground; but I shall mention other two. The first is, To harrow Ground that has been plowed, and at the same time ridged up or gathered before Winter; then to take a Line and mark out Beds about two Yards broad, a-cross as many Ridges as the Length of the Line will allow, leaving Alleys about two Feet broad betwixt the Beds, and gently to thrust in Potatoes into them, at about a Foot asunder: Dung being laid on the Beds, and carefully spread,
cleave

cleave out the Ridges, to lay the Furs the more upon their Backs; thereafter give it a single Touch of harrowing, to close the Seams, which will also be proper in the former Method. Thus the Work is at a stand until the Potatoes be above Ground; then, enter the Alleys with Spades and Shovels, and, by a moderate Covering therefrom, depress the Greens, for the Reasons formerly given. When the Weeds are fully sprung, pull them up, or rather hoe them toward the Potatoe-stems, as Cabbages, &c. are commonly hoed; and then the Work is finished.

The Use of thrusting the Potatoes into the Ground is, that, after the plowing, they may ly under the Furrow at the same Distance they were placed above it: Whereas, without this Precaution, they would be apt to fall into Clusters, which would occasion them to grow unequally. The first plowing and harrowing, not only makes the Ground the more open to receive them, but also prepares and meliorates it: For which Reason it were proper, unless the Earth be very loose, that, even where the Horse-hoeing Way is designed, the plowing and harrowing anterior to the Seed-fur were also in that Case given. I believe no Man will ever lose by Labour bestowed upon them, if the same be judiciously execute; but one small Neglect will go far to ruin a Crop.

The Reason why I propose that the Beds should be made across, and not amongst the Ridges, is, because they are too often very crooked, and so there is no getting straight Lines made from the one End of them to the other; and besides, the Ditches out of which the Coverings are to be taken, cannot so conveniently be made up when the Beds are carried amongst, as when across the Ridges, the after Plowings and Harrowings serving for that Purpose, when the Method proposed is taken.

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The other Way, with the Plow, is, To dung the Ground before Winter, if it be poor ; if it be rich, it needs none ; yea, I think the Potatoes would be the worse of it ; for, in very rich Land, they run excessively to Straw. Then plow the Ground. In the Spring harrow it ; till and harrow it again, and dibble in the Potatoes, at a Foot or eighteen Inches Distance every Way. Then harrow it again, to close the Holes made by the Dibble ; and so to cover the Potatoes. When they come up, hoe them ; and, as the Weeds rise, hoe again and again : For Weeds are naturally the Offspring of the Earth, and therefore she's fond of them, cherishes them, feeds them plentifully, and strives, for their sake, to starve every Thing we endeavour to force upon her. Let us therefore do all we can, upon all Occasions, to extirpate them.

Æsop knew this Matter much better than his Master ; and his Answer to the Gardener, who could not find out the Reason why those Plants shot up much faster that grew of their own accord, than those that he set himself, though he took never so much Care about them, is so pat to this Purpose, that I shall mention it : “ The Earth
 “ [said *Æsop*] is in the Nature of a Mother to what
 “ she brings forth of herself, out of her own
 “ Bowels ; whereas she is only a kind of Step-dame
 “ in the Production of Plants that are cultivated
 “ and assisted by the Help and Industry of another :
 “ So that it is natural for her to withdraw her Nourishment from the one towards the Relief of the
 “ other.”

Other Methods of planting might be mentioned, such as dropping the Seeds in every second Fur, as the Ground is a plowing, running over the Land with a Dutch Hoe when the Weeds appear, for in foul Ground they will be up long before the Potatoes, and thereafter hoeing the Potatoes as often

as shall be necessary: But those being the best that I know of, I shall avoid perplexing the Letter therewith, or with any Thing else that I judge unnecessary.

Before I proceed to give an Account of different Ways of preserving them through the Winter, I only take notice, that the Spade does not seem to be the best Instrument, at least in loose Ground, to raise Potatoes with; because it cuts them, whereby their Value in the Market is lessened. A Fork, with five or six small Toes, Grains or Prongs, as it leaves them whole, separates the Mould better, and exposes them more to Observation, is by some preferred.

They may be preserved thro' Winter by building a House on dry, sandy or gravelly Ground, where there can be no Under-water, and digging the Earth below it into the Form of the Pit of a Kiln; then placing as many of your Potatoes as can ly, without putting one above another, or, if thicker, by no Means immoderately; above them lay Straw as the thin Bedding of a Kiln, and above the Straw dry Earth, only a few Inches thick; above Earth Potatoes; and so on while any of them remain unpitted; and then a large Quantity of dry Earth above all.

If the Potatoes be taken up dry, so put into the Pit, and kept so, which the House serves to do, and also from being stoln, there is little or no Danger of rotting, and the want of Air prevents their growing. For want of a House, when it cannot conveniently be got, the Pit may be covered pretty thick with rank Horse-dung; or they may be preserved by giving them a good hearty Sweat on a Kiln, which makes them eat dry and meally. But then, in the last way, perhaps they won't answer for Seed: For which Purpose, there is not a better Method, if the Winter prove moderate, than, without raising them, to cover a Piece of the warmest
and

and driest Ground pretty thick with Horse-litter, which will keep them sound, by preserving them from the Frost, unless it be excessive.

When I am advising the covering of Potatoe-ground, in order to the preserving them through the Winter, I think, if Barn-yards were planted with them, double Uses might be got of these Yards, for they will still answer the first Design and ordinary Use as well as formerly; and by the Stacks, with the Hay or Straw that commonly fall about them, the Ground will be kept so warm, that the Potatoes would very probably be preserved till *February*, or the Beginning of *March*, when Barn-yards are usually emptied: This Ground would hardly fail to continue in Heart and Strength by what would fall upon it.

Another good Way, for all Purposes, is, to nail Spars above the Joisting of an ordinary Country-kitchen, and to lay them thereon, of no extraordinary Thickness; if they be frequently turned, the moderate Heat will neither over nor under-do them: Or they may be kept on a Loft or Deal-floor, mixed with dry Sheeling-seeds. Whatever be the Design, it is improper to wash them; for they are the more apt to rot, which is the only Danger; for in no Case will they grow before the Season of planting.

In *Galloway* we find, that Potatoes for Seed, as well as other Seed, require changing, not only from one Ground, but also from one Country to another; so, when we have Opportunity of purchasing any from *England* or *Ireland*, we chuse them, and find that the Produce is greater than from our own Potatoes. Moreover, that the Produce of a large Kind lately brought from the *West-Indies*, is far greater than any of the former.

Before I conclude, I incline to presume so much on the Society's Time and your's, as to inform, That I have been so unwilling to trust to my own O-

pinion,

pinion, or Experience and Observations concerning this Matter, that I have looked into several Books of Husbandry, but find little of Importance said upon the Subject, except what I have extracted from the Authors mentioned: But, with humble Submission, I will offer some Reasons why I'm disposed to think, that the cutting Potatoes for Seed, the not cutting them, or in what Manner they should be cut, ought to be more deliberately and accurately considered, than any Writers or Planters, so far as I have observed, have done.

In the first Place, I observe, that Potatoes in the Spring send forth young Growths out of each Eye or Joint, and nowhere else; which Sprouts grow all into Stalks, or otherwise, a Part of them into Stalks, and another Part of them into Potatoes; and that at the Root of one Stalk, at raising Time, will be found many Potatoes. Now, supposing this Observation to be just, there seems to be an Error either in cutting of them, or planting big ones with many Joints or Eyes in them, without cutting: I wish it was well understood, which is the right, which the wrong Way, and determined how many Eyes should be left with each Cutting, which would direct what Potatoes should be cut, and what left uncut: For, if a Potatoe sends forth six or eight young Growths, as several of them do; and if they grow all into Stalks, then these Stalks must necessarily require so much Food, that there can little remain to nourish Potatoes at each of their Roots, which therefore must be small, being so close together.

If this be the Case, then I think all that have many Eyes ought to be cut, that the Ground may not put forth its Strength into Stalks. But then, if only such of these young Growths shoot forth into Stalks, as the Situation of the Potatoes, when laid into the Ground, gives them Opportunity to
raise

raise themselves out of it ; and that the Potatoes at the Roots of these Stalks are nothing else but the Produce of the other young Growths from the original or Mother Potatoe, which, by their Situation under or upon the Side of it, could not extend themselves through the Earth ; then, if it be fit to cut them at all, the cutting of them seems, at least, to require Judgment and Discretion : Now, (if this hold) each Cutting ought to have more Eyes than one in it ; otherways, if a Potatoe or Cutting of it have but one Eye, it may have a Stalk, but a Potatoe at the Root is not to be expected, and such Stalks are frequently to be found : If so, no Potatoe ought to be planted that has not more Eyes or Joints than one. I shall next offer some Reasons for these Doubts, and this Way of thinking, and submit the Decision to the Honourable Society, being what I don't pretend to be a sufficient Judge of.

First, If the Earth be tenderly taken from the Root of a Stalk, the Skin of a Mother-potatoe will frequently be there found, with Potatoes around it, all joined together by so many Strings of the same Substance with the Potatoes themselves. Tho' the Stalks of the Potatoes be far stronger, and of a Nature and Substance, to Appearance, different from these Strings ; yet I think, this happens by reason of the Stalks being unconfined by Earth, and exposed to the Air : For I observe, that these Strings or Runners, when a Part of them is turned out of the Earth by the Hoe, grow Stalks, which as Wasters ought to be weeded away : Besides, it is the Opinion of some, that what is called the Seed, and grows on the Top of the Stalk like an Apple or Ball, is nothing else but a Potatoe, and would have been so as to all Appearance, and in all Respects, if accidentally the Mother-potatoe had fallen into the Ground with that Side under that

was

was uppermost, that in this Case, the Potatoes at the Root would have proven the Balls at the Top of the Stalk; and that the Strings to which we see the Potatoes stick and grow, would have been as the Stalks, had they been unconfined, and as much exposed to the Air. It is no uncommon Thing to throw such of them as are not used for pickling, for which Use they serve very well, into the Ground for Seed: But I am afraid, they seldom in that Way answer the Purpose, being originally from a warmer Climate than ours.

The Curious may proceed more properly, by gathering the Apples, if the Frost allow them to ripen, putting them into a Tub, till the Pulp rot, washing it off, drying the Seeds in the Sun, or any other Heat of equal Moderation, keeping them in a proper Place till the Spring, and then planting them at reasonable Distances on a Piece of well prepared Ground.

A noble Peer's Gardener told me, that he made this Experiment; that the Seeds grew, and that the Potatoes were very small; but that having planted them next Year, they grew tolerably large.

I have heard it confidently asserted, that, in such Years as Frosts do not prevent the hardening of the Potatoe-stalks, if you take them before the Frosts come, and dig them into a Piece of dry, warm Ground, where Potatoes never were, you will in the Spring find many small Potatoes. If this be true, and what I think Mr. *Tull* says, that the Joints of all Straw have Plants of the same Kinds included in them, can be depended on; then what is said about the Apples seems the less surprising: I leave the Solution of these Questions to the Experiments of the Curious.

This I can say with Assurance, that it is possible, by the Directions I have offered, to get an Acre of Potatoes worth from ten to twenty Pounds *Ster-*

ling or upwards; and yet that the Ground shall be equally or very near as good for the succeeding Crop, as if it had been Summer-fallowed without them, even tho' the Greens, when fully flowered, be applied to Cow-feeding; for which Purpose I have found them to answer well, and they are by some thought as good, yea more nourishing than the same Quantity of Clover, without Hurt to the Roots; which, by that Time, being become strong, will make the greater Demand of Food, must swell in Proportion to the Quantity they get and retain, and will have the larger Provision of it, as the Waste by the Stalks is by the cutting prevented, at the Time when the Plant is exerting itself for Propagation, which is the Time when all Plants perspire most, and therefore make the greatest Demand upon the Earth.

How beneficial an Improvement is this? How many good Ends and Purposes does it answer? The greedy Husbandman's Mouth seems to be stopped: He never had good Reason, now he has none at all, to cry out, What pays the Rent the Year the Ground lies fallow? By this Potatoc-husbandry he gets a good Crop above Ground, an exceeding good one under it, and the Ground improv'd very near as much as if it had been Summer-fallowed, bearing no Crop; and all this in one Year, and upon a very moderate Expence. What more can the Heart of a Man desire? What! would he ly in his Bed, and have Wealth come in at the Doors and Windows to him? No, *in the Sweat of his Face must he eat Bread*; and besides, he must exercise his Head, as well as his Hands, design prudently, and execute carefully.

Some Things, Sir, I have advanced, being speculative, I give no positive Opinion about them, leaving to others to judge how far they are reasonable and worth Consideration. This I am sure
of,

of, *That with all our seeking, we should seek Understanding; and, since my Intention is toward the publick Good, I hope my Presumption or Mistakes will be pardoned. I am, &c.*

It was observed that, in the very first Season after the Publication of this Paper, more Potatoes were planted in the Neighbourhood of Edinburgh, than had ever been set there in the Memory of any Man then living.

Another LETTER of Mr. MAXWELL's to Mr. HOPE.

S I R,

NECESSARY Affairs have for some time called me to this distant Part of the Kingdom [*Dumfries*], otherwise I had certainly frequented the Meetings of the Society. I am highly sensible of the Disadvantage I am at by want of the Means of so valuable Instruction as the Subjects there handled afford: That Loss I own is not to be made up; but what is in my Power I endeavour, and embrace all Opportunities of conversing with intelligent Persons. Among others, I have of late been with Mr. *Heron* of *Bargally*, in whose Garden there is a great Variety of Curiosities to be observed.

He is, in my Opinion, the most learned and ingenious Gentleman in the Article of Gardening I ever conversed with, and has favoured me with an Opportunity of communicating to you and the other Members of the Society, that he has found out, and has in his Garden, the valuable *Roman Cytisus*; concerning which you have a Memorial in his own Words subjoined, which he presents to the Society.

Potatoes being generally, and I think justly, considered one of the greatest Improvers of barren
Grounds

Grounds of any Plant whatsoever; I asked the Opinion of this intelligent Gentleman, as to the Manner of planting and managing of them, and showed him a Copy of my Letter to you concerning these Matters. He approves of it, with this Addition, (by which the Expence of Dung is saved) that Fens, Tops of Whins, or Broom, being spread on the Surface of the Ground in a good reasonable Thickness, when they have most Juice and Sap in them; and the Earth, that in the lazy Bed way is thrown from the Trench above the Potatoes, being laid above the Ferns, Tops of Whins, or Broom, to ly and be exposed until the proper Season; then the Potatoes, planted as Garden-beans, or pointed in with a Spade, will grow equally well as if the Ground was dunged any other Way. This I think fit also to communicate, being his Practice, and seeming reasonable; for the Surface of the Ground, and the Ferns, Tops of Whins, or Broom, in which there is much Salt, and also the Grass-side of the Turf thrown up, all rot, and the Mould uppermost receives the Benefit of a Summer-fallow.

Mr. HERON of Bargally's Memorial.

THE old *Roman* Cytisus I understand to be the small bastard Cinna, which fattens all Sorts of Cattle to a Wonder: It is propagated by taking the Suckers, and planting them in weak Stubble-land, at three Feet Distance. They will in a little Time over-run the Ground to that Thickness, that it may be mowed three Times a year, not suffering it to grow above a Foot high before mowing; and, as I think, may continue for sixty Years. The Plant runs, is a greater Increaser, and the Leaves
and

and Flowers are as sweet to the Taste as the richest *Dutch* Clover.

This short Account of Mr. *Heron's*, wherein he only mentions, that his Plant will thrive in weak Stubble-ground, implies, that it will prosper better in good Land well prepared.

Mr. *Switzer* differs from him, and says, the *Cinna* is not the same Plant which the *Romans* called the *Cytisus*; and that he himself has found it out. Be this as it will, both may be propagated, the Name is not material; the most useful should be preferred, and Experiments must determine which is so.

A LETTER, concerning Mr. TULL's Method of Improvement, to a Person of Distinction in Scotland, and by him communicated to the Society.

I Have been at the Lord *Ducie's*, where I have seen several new Methods of Husbandry, particularly with Wheat. One Mr. *Tull*, a Gentleman who was bred a Scholar, turned his Philosophy towards Plants and Husbandry, and by Experience found, that the constant Expence of Manure, which was necessary in the common Way of Agriculture, ate up so much of the Profit, that it did not answer. This Gentleman I did not see; but his Son lives with this Lord, and from him I had the following Directions:

If Wheat Land be out of Order, by being foul, or run out, begin to fallow it at *Christmas*, and again in *March*. Be sure you plow the second time the same Way as at first, because by that Means you'll probably break some hard Lumps that may have remained after the first Plowing: But the
third

third Time it may be cross-plowed, which will certainly mellow the Ground. If you can plow it a fifth or sixth Time, it will do the Ground more Good than if you dunged it. By this Method he thinks his Dung rather an Incumbrance than of Use for Corn; because it brings up Weeds, which take away the Nourishment the Corn should get. The earlier the Wheat is sown the better. The Wheat must be sown with a Drill, which is a Machine that holds the Corn to be sown in a Box. There are two Holes, which open by a Spring as the Drill turns on an Axletree, which lets the Corn fall in two Rows about a Foot apart. There is a little Thing like a Plough, no greater than a large pruning Knife, which cuts the Ground at a certain Deepness before the Holes that drop the Corn; and a little Harrow fixed to the Machine, that closes the Ground upon the Corn after it is sown. This is the only harrowing it must get; because the common Harrows bury a great deal of the Corn so deep, that it never comes up.

When you come to the End of the Field, you must turn the Drill, and leave a Space of about five Feet betwixt these two Rows of Corn and the next, and so on. The five Feet Space, that is left betwixt the Rows of Corn, is to be plowed with a Hoe-plough as often as you can, the oftner the better, though even five or six Times; and that Interval is to be kept in plowing both to destroy the Weeds and mellow the Ground. Besides, the keeping the Ground moved, makes the Corn grow the better, and in greater Quantity, and the Straw stronger than in the common Way.

The Drill is drawn with one Horse, a Boy to lead him, and a Man to follow it, who lifts the Drill quite up from the Ground when he turns at the End of the Field; and the lifting stops the
Corn

Corn from falling out till the Wheels it runs upon are set a-going again.

The Hoe-plough must have two Horses, a Man to hold it, and a Boy to lead them. They sometimes use Oxen to the Hoe-plough, or more Horses if the Ground is strong; but whatever draws, must be muzzled, for eating the Corn. By this Drill you sow less than a Bushel to the Acre, which is a great deal of Seed saved. If it is dry Weather, and the fallow Ground not broke enough betwixt the Rows of the Corn, you may harrow and roll it.

By this Method you have near as great a Crop upon an Acre as in the common Way, though the Ground be dunged. Next Year you manage the same Ground after the same Way, and sow it again with Wheat only: The Corn must be sown where the Interval was the Year before; and the Place where the Corn is to be sown should be raised into a little Ridge, to ly all Winter. They have had four Years Experience of this Way, Wheat after Wheat, and it grows always the better.

I likewise saw the Method of managing St. Foin, which I am much fonder of than of the Wheat; because, when it is once sown, you have no more Expence about it: It is certainly a great Improvement; because you immediately let it out for a great Rent, when perhaps the Ground before has paid very little.

One Way to prepare Ground for St. Foin, is, to plow it in *March*, and hand-sow it with Vetches, two Bushels to an Acre. Just when they blow they are good Hay. Nothing kills the Weeds better. Then they prepare it for Barley and St. Foin.

Another Way to prepare bad dry Ground for St. Foin, is, to make the Ground very fine, and sow it with Turnips, by a Drill, about Midsummer, the Rows four Feet apart: When the Leaves are about
the

the Size of half a Crown, thin the Rows with a Hand-hoe till the Turnips are near a Foot apart in them ; this gives them Room to grow. Then plow betwixt the Rows with a Hoe-plough within a Month after the sowing. If the Ground be weak, plow it in *March*; if strong, before Winter, that it may be mellowed with the Frosts. This should have been said first.

When you feed black Cattle with Turnips, carry them off the Ground, and throw them into an Heck or Grass-field hard by; for if you turn the Beasts in, they potch the Land, which hardens it, and they spoil more Turnips than they eat. Don't cut the Turnips, but let them nibble for themselves; for when they are cut, the sharp Corners are apt to choke them. Sometimes an Ox will go half a Day with a Turnip in his Throat. If he should, you must have a bit of Rope, the Size of your Wrist, with a fofy End; which you dip in Butter and cram it down his Throat. Several Oxen in *Norfolk* have been choked with Turnips, and several saved by this Method.

After the Turnips, plow the Ground in *February*, and a second Time, in the End of *March*, or Beginning of *April*. If you hand-sow the Barley and St. Foin after the common Manner, you must have eight Bushels of St. Foin to the Acre, harrow the Ground before sowing the St. Foin, and after it, until it be very fine. Roll it immediately, if the Ground is very dry. if you do it not immediately, do it not at all: For if the St. Foin is come up, it is so tender that it breaks over, and will not recover. The best Way is, to sow the Barley and St. Foin with a Drill at the same Time. The Drill I send you for the Wheat, holds the Barley; and there's another Drill clapped on behind it, for dropping the St. Foin, which answers to the wide Spaces of the other Drill: So the Rows of Barley
and

and St. Foin are half a Foot from each other. The Advantage of a Drill is, that a Bushel is the most you sow to an Acre; and if the Ground is good, half a Bushel will do: The Drill sows the Ground at a certain Deepness, about an Inch and an Half.

Mr. *Tull* has found by Experience, that what is sown deeper, does not come up; so most Fields of it are in Spots, and not equal, besides sowing so much Seed, which is a great Charge. A Drill, with one Man, one Boy, and one Horse, will sow five or six Acres a-day. If Grounds are poor, it is best to sow the St. Foin by itself without Barley, because that saves so much Sustenance to the Grass; yet most People grudge to have so much Labour and no Crop the first Year: But if you'll drop the Barley, the Goodness of the St. Foin will soon repay it.

If you sow the St. Foin by itself, you may do it any Time betwixt Barley-season and Midsummer. It is best not to feed Horses or black Cattle on it for a Year or two after it comes up, because it is very frush: But you must never let Sheep on it; for they eat it so near, that they destroy it, if it were twenty Years sown. If there are Couch-grass Roots, you must burn them before you sow it, and spread the Ashes. It must be mown before it be half-blown, and allowed to ly about two Days in the Swath without turning. Then put it in small Grass-cocks, and double them every Day, without throwing, till it is pretty well made, but not over dry. Ten or twelve Cart-loads is enough for a Rick. To prevent its heating too much, build a Basket in the Middle of the Rick, and draw it up till you come near the Top, and then close it over as you do other Hay Ricks. If the St. Foin is drilled, it must have no other harrowing than the little Harrow fixed to the Drill gives it.

No high Ridge is proper for the drilling Husbandry of any Kind. The flatter the better.

A Sack filled with Hay, Straw, Chaff, or the like, will answer the Purpose for which the Basket is proposed.

An Answer having been wrote to this Letter, desiring a Solution of several Doubts and Difficulties, Mr. Tull himself wrote as follows.

THE only Way we have to enrich the Earth, is to divide it into many Parts, by Manure, or by Tillage, or by both. This is called *Pulveration*. The Salts of Dung divide or pulverise the Soil by Fermentation; Tillage by the Attrition or Contusion of Instruments, of which the Plough is the chief. The Superficies, or Surfaces, of these divided Parts of Earth, is the artificial Pasture of Plants, and affords the *vegetable pabulum* to such Roots as come into Contact with it. There is no Way to exhaust or drain the Earth of this *pabulum*, but by the Roots of Plants; and Roots are now proved to extend much further than it was commonly thought they did. Division is infinite; and the more Parts the Soil is divided into, the more of that Superficies, or vegetable Pasture, must it have, and the more of these Benefits which descend from the Atmosphere will it receive; and also the less Quantity of Plants there is to exhaust it, the richer, and the more replete with *pabulum*, or vegetable Particles which adhere to the said Superficies, will the Soil remain: For, if the Vegetables carry off a less Quantity of Matter than is received from the Atmosphere, the Substance of the Land is increased; but if it be contrary, then it is diminished. Now, if the Land be plowed more
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than once, and yet not sufficiently to kill the Grass and Weeds, they may exhaust it more than the Tillage does enrich it; and then the Soil may be made poorer, or at least the Crop will be so, if the Grass and Weeds be too many for it; and it were better to give it but one Plowing, which will turn the Grass under, and stifle it for a Time, till the Corn is able to contend with it.

Twenty Years ago, there was much the same Way of Tillage in *England* as is now in *Scotland*: But it has been since exploded by full Experience, and the Farmers have enriched both the Land and themselves by plowing it more than they were wont. Their light Land, when they plowed it once in three Years, was dear at 2 s. 6 d. per Acre; now, since they gave it about ten Plowings in three Years, it is worth 20 s. Rent. The same Land which was formerly thought capable of bearing no Corn but Oats, yields Crops of Wheat, Barley and Clover. They are now able to purchase more Land than they were then able to rent, whilst they followed their once plowing Husbandry. Their Notions are so much changed, that they cannot bear to be told of what they once said, viz. That too much Plowing works all the Substance out of the Land. They now affirm, that too much is impossible. Tillage is not always to be esteemed by the Number of Plowings, but by the Degrees of Pulveration made by them: For turfy Land, plowed once moist with a four-coultered Plough, which cuts a deep Furrow of eight or nine Inches broad into four equal Parts, and then plowed twice with a common Plough in dry Weather, has been brought into better Tilth, and in a fourth Part of the Time, than eight common Plowings would have made it. Tillage is indeed expensive; yet it has been found necessary to plow most of the strong Land, in all the Places I know, three or four Times for Wheat, besides the Expence of Manure, &c.

&c. If I should tell the Farmers here, that there is in this Island a Country wherein it is doubted whether a Crop of Wheat will grow after Pease, they would doubt my Sincerity, and think I talked like a Traveller. I have used the Method of Horse-hoeing Wheat no more than four Years, and in each of two of them I had about six Acres, and never dunged above three; and that did Hurt: But it was by Accident, being a blighting Year. The Dung and Hoeing together made it too gross, and occasioned it to be blighted by insects. The Stalks of it being more soft, they could the more easily bore the Kind to deposite their Eggs. I have also numbered a few Rows not hoed, on purpose to try what Proportion dunging might bear to hoeing; and to my great Surprise I found, that 2 s. bestowed on hoeing would much outdo 40 s. in Manure. What we call Hoeing, is only two Furrows turned from or towards one another. In four Hoeings the Plow travels just as far as in one plain Plowing: For in six Feet there are eight Furrows of nine Inches each, our widest Ridges being six Feet. Three Hoeings are equal to two plain Plowings. These are the most that ever have been given in the whole betwixt the reaping of two Crops. Our Intervals are not quite five Feet. Two Furrows plow one Interval; because the Earth which the Plow throws out, covers much more than the Breadth of the deep Trench out of which it is raised. The treble Row has two Interstices within it, seven or eight Inches each, which we call *Partitions*, to distinguish them from Intervals, which are four Feet and eight or ten Inches*. The Hoe-plough is made to follow the Horse or Ox; on the left, to turn the Furrow from the Row; on the right, to turn it to the Row. It will also follow in the Middle, if the Ploughman pleases. The Cattle

* Two Rows with one Interstice were afterwards found by Mr. Tull himself to be better,

Cattle never tread on the Corn. Oxen are taught to draw in a single Line or Row as Horses, and to go in the Limbers or Shafts of Hoe-plough or Waggon. The Drill, to plant eight Acres *English*, travels eleven Miles besides Turnings. The Advantage of these wide Intervals, is for cleaning the Land from Weeds, and to enrich it, so that it may produce a Crop of Wheat every Year without Manure. The Produce is not commonly so large as when the Intervals are narrower; but when they are, we can expect but one Crop. We drill in these treble Rows less than a Bushel to an Acre, and are content to receive sixteen or twenty Bushels from it: But the Quantity is according to the Goodness and Management of the Land. There is sometimes a Ridge in the Middle of the Interval, and sometimes a Ditch; and this, at the last Hoeing, we leave as deep as we can, without moving any of the bad Earth. We plant our next Crop of Wheat as soon as we can after the preceeding Crop is off, and the Weather is proper for it. There can be nothing sown on the Head-ridge; but what is necessarily so lost at the Ends for turning upon, is not generally more than a fortieth Part, and of an inconsiderable Value: Yet not quite lost; for the Grass becomes the sweeter for being scratched often with the Plough. We bait our Horses thereon. It is only by Accident that Dung injures Corn; and Dung might save some of the Hoeings. But as I have neither Downs, Meadow nor Pasture, except St. Foin; and Wheat-straw being for other Uses, I am not troubled with much Dung; and the little I have I chuse to put upon my poorest Turnip-land. Ryegrass is grown out of Fashion here, because it fouls the Ground; as great Clover is very common for having a contrary Effect. I have known St. Foin succeed in all Parts of dry Land; but still the richer the Ground is, the better will the Crop be: And that Land always produces the most of it wherein
the

the Roots run deepest, unless where there is too much Moisture. This I fear was the Cause why the Lord *Haddington's* St. Foin failed. Half a Bushel of St. Foin Seed will plant an Acre, at ten Seeds to every square Foot; and if two of these grow, and stand regularly, it will be, when in Perfection, rather too thick than too thin. The Value of St. Foin is various, according to the Goodness of the Crop, and to what Price Hay bears. I have known drilled St. Foin in *Oxfordshire* sold, standing, at 4 *l.* per Acre, and have there often seen 300 Stones of that weighed from an Acre, the Soil being very rich and deep, having nothing to obstruct the Roots from running down, I believe, several Fathoms. The Hay of St. Foin, when ripe for Seed, is worth little; but cut when it begins to blossom, has no Equal that I know, except Lucern. They who are the most expert in the common Turnip-husbandry affirm, that if they suffer a greater Number than thirty Plants on a square Perch, their Crop is diminished by its Thickness. The narrowest Intervals of drilled Turnips are three Feet. This Way brings a greater Number to Perfection than the sowing them at Random; and is found, when well Horse-hoed, to bring Crops double to the sown: Black Cattle eat every Part of a Turnip when pulled up to them, and are feasted by them, though they refuse them the three or four first Days. Sheep do the same. The Ground from whence hoed Turnips are taken, is observed to produce a much better Crop of Barley after them than at any Time before: Which shows that the Ground receives more Benefit from the Tillage, than Injury from its being exhausted by the Turnips. The Effect of Peat-ashes lasts three Years, viz. to a Crop of Pease, Barley and Clover. At Autumn, they sow Winter-vetches, in the Spring Gore-vetches, being a Sort that runs much to Haulm.

Haulm. No other Sorts are in Esteem here. There are several Reasons why hoed Turnips exhaust Land less than sown Corn does, though the Crop of Turnips taken off be ten Times greater than the Crop of Corn.

Directions for burning Lime-stones, and manuring Ground with Marl, Lime, Water, &c. Presented to the Society by Mr. Lummis, an Englishman.

IT has of late Years been found to be the most beneficial Way, to burn Lime in Kills in the Shape of an Hogshhead; that is, small in Circumference at the Bottom, gradually wider to the Middle, and then contracting again, as beneath, upwards to the Top. This Kill I make entirely within the Surface of the Ground, on the Declivity of a little Hill or rising Ground, so as to have free Access to the Air-hole or Furnace of it. About one Foot from the Ground I place Iron-bars, to give the Kill a good Draught. For this Kill the Stones need not be broke so small as is commonly done for those above Ground.

The Kill thus made, I first lay upon the Bars small Wood or Whins, then small Coals, then Stones about the Bigness of an Egg, then Coals, &c. but until I come to the Middle of the Kill, I make the Stones bigger and bigger, observing to lay the smallest Stones of the Size at the Bottom nearest to the Sides of the Kill: In the Middle I lay Stones almost as big as half a Peck, and so go on with a Progression of smaller Stones, until I finish my Kill as I began it.

By this Method I always burnt the Stones with half the Expence of Coals necessary in the ordinary Way above Ground, and had them truly burnt, without raw Stones, or running into Cinders.

Where

Where there is no Conveniency for making a Kill as above, one must burn in the common Way above Ground; and in that Case the Stones must be broke very small, as for the Bottom and Top of the other Kill; but it will take almost the double Quantity of Coals. When you fill and finish either of the Kills, the Top must be covered all over with Sods or strong Turf; so that the Heat may be as intense at the Top as possible, and prevent the Winds from blowing the Fire at the Top, the Rains from extinguishing of it, or rendering the Fire less intense than it should be. Now, considering the Structure of the Kills, and the Charges of breaking the Stones for the latter, with almost the double Quantity of Coals, it is obvious, that the former Method is much preferable to the other, as being much better and cheaper; and I have certain Experience that it is so.

This Stone, when burnt into Lime, is an excellent Manure for Land, provided it be properly applied. The Method I have experimented to be best is as follows: On the Swaird or Turf of a strong clay Ground, I lay three or four Pieces of the biggest Stones together, in the Month of *October*, and so over the Field; and of the small Stones such a Quantity as is equal to the big ones, so that seventy or eighty Bolls may complete an Acre. If Rain falls, it melts immediately; if not, it will melt or flake in forty eight Hours, or less, according to the Moisture of the Air. Then it is to be spread directly, leaving no Part thereof upon the Spot where the Stones were laid. This done, I let it ly twelve Months, or till the Month of *November* after the *October* Twelve-month, when I chuse to lay it on the Land; then plowing it, I let it ly all Winter; and then Frosts and Rains do so mellow and prepare the Ground, that, when it is plowed

plowed again, it is in fit Order for Barley against the Spring.

This Method I prefer to laying the Lime on in Powder; because in Powder it is apt to be blown about with the Wind, to the great Hurt and Detriment of both Men and Horses; such as, spoiling the Mens Eyes, Hair and Cloaths, and the Eyes and Hair of the Horses, making their Coats look dry and ugly; besides losing much of the Lime.

The Lime laid on, as above directed, on a strong ley Ground in the Month of *October*, and continuing spread for about twelve Months before it was plowed, has been found so to alter the Grass to a fine natural Clover, that, by feeding of Sheep or black Cattle upon it, it has paid the whole Charge the first Year by the Grass; and Cattle will chuse rather to feed on this Ground than any other, and grow fatter.

If the Ground be loose and open, then, if limed in *October*, it may be plowed in *March*, or the Spring following. In both Ways it so far meliorates the Swaird, and makes the Ground in so good Order, that you may expect as good Crops for three or four Years, as from Land of 20 or 30 Shillings the Acre. The fourth or fifth Year, by laying some Dung upon it, you may have two or three Crops more; and then your Ground will be in very good Order to lay down with Grass seeds.

Notwithstanding that Lime is so very good Manure, yet I prefer Marl to it, provided it can be had within the Ground, or near the Place where it is to be used; for altho' it is more chargeable at first than the other, yet, lasting five Times as long, it is in the End much cheaper. I generally lay near two hundred Loads of it upon the Acre, at about seven or eight Bushels to the Load.

It is to be observed, that the Surface of the Ground, where Marl is found, is often of a strong

Clay Nature, and so is a fit Manure for sandy or gravelly Ground, or any light Soil; for which I chuse to use about a Foot and an half of the Surface in Manner following. I lay about forty Loads of it at ten Feet wide, and about a Foot thick; then I lay over that about three Loads of burnt Lime-stone, then a Course of more Earth, and, if it can be had, a Course of Malt-dust or Soot; then more Earth; next a Course of Lime-stone; and so on, till I have four or five Courses of each. I let this ly for about two Months, in which Time it will ferment; if in warm Weather, sooner than two two Months; then I turn all over, and mix it well; so I let it ly for about six Months more, and then there is nothing will be a better Manure for the Soils afore mentioned.

It is further to be observed, that in all the Marl-pits that I have had the Experience of, the deeper I digged, the better and finer was the Marl; and tho' it is a common Saying, that he

*Who marls upon Clay
Throws his Money away;*

yet the Fallaciousness of this Proverb is evident to me from undoubted Experience; for the deeper I dig into a Marl-pit, the finer and better is the Marl, so that the Bottom-marl is as good a Manure for the strong Clay Ground, where it is commonly got, as the Head of the Pit, compounded as directed, is for sandy, gravelly, light Soils.

It may be alledged by some, that the Malt-dust or Soot are not to be got in some Places, and that the Dung of Cattle may be used in place of them. To this I answer, that there is no Rule without Exception; but this I can aver, that if they can be got, they have in their Natures such a meliorating and fermenting Quality as renders them most fit

Ingredients

Ingredients for this Manure ; and I suppose where Malt-dust cannot be got, the Soot can : But if none of these Ingredients can be obtained, the Dung of Cattle may be used.

I look upon the above to be the best simple or compound Manures that are made use of, except watering ; which is undoubtedly preferable to them all, either with Land or Sea Floods, that is, fresh or salt Water : Where Land lies so that it can have the Benefit of either, nothing can be better ; and it is worth the Expence of making Engines for that Purpose, Descriptions of which would too much lengthen this Narrative.

For an Example of flooding your Ground, either by making Courses, or by Engines, overflow your Grass Ground until about six Weeks before mowing Time, again afterwards for a second Crop ; but mind never to let the Water ly upon the Ground above forty eight Hours at a Time, lest it chill it ; and this never fails to make a plentiful Crop of Grass.

This, Honourable Gentlemen, is a small Specimen of my practical Knowledge in manuring Ground, founded upon long and repeated Experience, and humbly offered to your Consideration ; may the Practice of it always answer your Pains and Expectations, as it has never disappointed me.

It is doubted, if Lime will have quite so beneficial an Effect, as Mr. *Lummi*s mentions, upon Ground for Grass ; and it is proper to remark, that the Marl he speaks of is Clay-marl ; for if the Shell Kind were laid on in so great a Quantity, Corn could not stand.

A Letter

A Letter with respect to a reverberatory Draw-Kill for burning Lime or Earth, from Mr. Robert Scot of Duninauld, Advocate, to Mr. Hope of Rankeilor. Communicated to the Society.

There is much in the Situation of, and Roads leading to the Kill. A Hill-side is almost necessary; because you must have a level Space or Yard as well at the Top of the Kill as at the Bottom, and Roads leading to both. The Coals and Stones should ly ready on the Level at the Top of the Kill, that they may be drove into it by Hand-barrows: The Coals on the one Side of the Kill, and the Stones on the other; where there should be Room for the Breakers to sit or stand; and likewise Room betwixt the Stones and the Coals for a Cart to turn in when the Stones are brought to the Breakers.

In *Fife* they stand when they break, as they do every where, so far as I know, but here, [*Duninauld* in the Shire of *Angus*]. I cannot tell whether it is owing to the Laziness of the People, or the Hardness of my Stone, that perhaps requires to be struck with more Exactness, and a shorter shafted Hammer. It is a good Day's Work here to break ten Bolls of Stones. I have two Men for boring and blasting; three for breaking, and helping to fill up the Kill at Night; one that draws the Lime-stone from the Kill, flakes and delivers, &c. and one more that has a two-horse Cart, for leading the Stones from the Quarry to the Level at the Top of the Kill. We generally raise no more Stones than what serves for the Time; for the Kill burns between sixteen and twenty Bolls of Stones a-day, and this requires all Hands to work close.

Our

Our Boll is *Linlithgow* Meal-measure, 8 per cent. more than the Standard. With this Firrot we measure Shells, or burnt Stones and flaked Lime. The Shells are heaped on the Firrot with Spades or Shovels. The flaked Lime is straked Measure. Unburnt Stones will sometimes weigh about 32 Stone Weight *Amsterdam* per Boll. Shells will weigh about 25 Stone Weight the Boll. The Boll of Shells will yield three Bolls of flaked Lime, and the three Bolls of flaked Lime will weigh about 39 Stone Weight.

Nine Stone Weight of Coals will burn a Boll of Stones. The Load, or 18 Stones of Coals, costs me 5 *d.* prime Cost, 5 *d.* Freight, and 2½ *d.* Duty, Custom-house Dues, and Carriage from the Shore to the Kill. In bad Weather I have the Coals to lead from a greater Distance, and then they cost me more.

The nine Stones cost me, at this rate, 6¼ *d.*; and Work being cheap here, I compute the seven Men at 6 *d.* a-day each; the two Horses and Cart at 1 *s.* 6 *d.* and the Powder and Repair of Tools at 1 *s.* 6 *d.* a-day: So the Accompt will stand thus:

	<i>L.</i>	<i>s.</i>	<i>d.</i>
The Value of 16 Bolls of Shells here is	1	6	8
To 16 Barrows of Coals at 6¼ <i>d.</i> is	8	4	
To Workmen, Powder, Carting and Tools	—	—	6 6
		14	10
Neat Profit	11	10	

Miscarriages will happen in the Burning with bad Weather. We have Shutters for the Vents, to stop one or more of them as the Wind blows. If there is not ready Sale, or if the Weather be so bad that I cannot take off the Limestones to the Land

as they come out of the Kill, I carry them in Barrows, which are just Measures, into a Lime-house, as near the Kill as Conveniency could allow: These are kept for selling out in flaked Lime. It would be a very good Way, to agree with a Quarrier for the Number of Bolls delivered, and likewise with the Breakers, or an Undertaker for all, after a Trial is made of the Nature of the Stone, and to limit the Workmen to a Quantity of Coals proportioned to the Lime or Stones burnt.

They work the Lime Quarries in *England* at a very easy Rate. The Seller of the Lime furnishes the Proportion of Coals; and, as I remember, the Maker of the Lime gets for all the other Charges, from 1 *s.* 4 *d.* to 2 *s.* for the Quantity of each Fodder, or Wain-load, he delivers, which I reckon is about the Bulk of eight of my Bolls, tho' not so heavy. Their Quarries are very easily wrought, and generally their Kills are lower than their Quarries, so that they come easily to the Loading of their Kills, and their Limestone is either soft Chalk or brittle Stone. *Clitheroe*, near *Preston*, would be a proper Place to get a Lime-burner.

My Quarry is very hard Stone, and all within Flood-mark, which occasions my Kill to be situated high above the Quarry, and you see my Coals cost me very dear.

Description of the Kill.

AT Bottom, the Kill must be three Feet four Inches wide; and at two Feet four Inches high, three Feet six Inches.

At four and a half Feet deep, it must be four and a half Feet wide.

When the Kill is formed to four and a half Feet high, and four and a half Feet wide within the
Walls,

Walls, the second Batter begins; and from four and a half Feet high, it must be built so as to be exactly ten Feet wide within the Walls, when it is ten Feet high.

When the Kill is ten Feet high or deep, and ten Feet wide within the Walls, you must begin a third Batter; and at the Height of fourteen Feet, it must be exactly twelve and a half Feet wide within the Walls.

When the Kill is fourteen Feet high, and twelve and a half wide, a fourth Batter must be begun; and when it is nineteen Feet high, let it be rather less than fifteen Feet wide.

The different Batters must be made as imperceptible as you can; and, from Top to Bottom, quite smooth Work, that the drawing out of the Shells or burnt Stones below, may make the whole Limestones above fall down equally.

The first Lintels that are laid above the Vents should have a good Grip of the Wall, and must be strongly jamb'd in: They must not project within the Kill, but be all quite smooth from Top to Bottom. A Kill of the above Dimensions will burn 20 Bolls of Limestone each Day: But, you may make it larger without altering these Dimensions, if you only add two or three Feet to the Height, which will require strong Walls. If you add any Thing to the Height, you need not batter it in the Inside at all, but make the Addition perpendicular.

Fix a Pole in the Centre of the Bottom or Floor of the Kill, from which you may have a Line to stretch round the Kill as you build up, it will direct you to vary the Batter as directed.

The Kill has four Vents, each opposite to one another, and has no Brand-irons whereupon to lay the Coals and Stones, they being supported by old Timber, Broom, Whins, &c. above which, the
Coals

Coals are laid : But, if the Kill be built to a Brae-face, or the Side of a Rock, it can have but three Vents.

This ingenious Gentleman, who is a notable Husbandman, has tried many Experiments, made useful Observations where-ever he occasionally went, and has travelled all the best improved Counties in *England*, purposely to make further Discoveries, you see, has given an exact Description of his Kill, and distinct Account of his Lime-work ; which, by his Knowledge, Assiduity and Industry, is come to be a very considerable Improvement of his Estate*, notwithstanding the Situation and Hardness of his Stone, and that he can get no other Fuel but Coal, which costs him so dear ; yet I think proper to take Notice, that others build such Kills in different Forms.

The Earl of *Stair*, to whom we were obliged for many excellent Examples, had one at *New-Liston*, and others in *Galloway*, built in the Shape of an Egg, opened a little at both Ends, and set upon the smallest. This Kill answered exceedingly well ; and, besides Limestone, burnt any Kind of Earth that was thrown into it.

Mr. *Lummis*, in his Memorial, P. 191. to which I refer, directs to make this Kill resembling a Hog-head ; and to me it seems worth Consideration, whether these Kills, swelling at or above the Middle, and contracting again at the Top, will not reverberate more strongly, and make a greater Intenseness of Heat, than such as grow wider and wider, and are not contracted.

* His Estate, as I am informed, is now improved from about 200 Pounds of Rent, to betwixt 8 and 900.

A Letter from Mr. Maxwell to Sir Alexander Mackenzie of Coul, Baronet.

S I R,

I Do not remember how you called the Muir concerning the Improvement of which you asked my Advice: My Memory cannot easily retain the *Irish* Names of your Places; but, as it lies between two Rivers, which meet at the lowest End, and as there is a Loch at the Back of the Hill, which lies at the other End of it, both the Muir and Hill are near inclosed by Water: As the rest might be fenced on no great Expence, I humbly propose, that that may be first done; and then you can truly say the Ground is your own: Next, that the Muir may be divided from the Hill; and then, that all wet Parts be drained; inclosing, dividing, and draining, being the first Steps to all good Improvement. You will observe, if you are pleased to follow my Advice, that these are more necessary in the present, than many other Cases. The Draining can only cost a Trifle, the Generality of the Ground being dry; and the Inclosing, which will come to the greater Expence, may be best delayed, the Field being so far encompassed with the Rivers and the Loch: However, I shall suppose the whole to be done; and on this Supposition I shall proceed.

The next Thing to be considered is the Nature of your Soil, which is very sandy and light almost every where; and it appears, tho' the Ground lies beautifully, that it is not very good, even of its Kind, seeing it bears a short Heath, with Juniper-bushes, and little Grass; yet I hope that by the Methods I shall direct, all your low Ground, between these Rivers, shall become pleasant to look upon

from your House, and highly profitable, upon a very small Expence.

The Situation and Nature of your Ground being described, and, I believe, justly, it seems to me to be more proper for Grass than Grain, unless another Course of Husbandry were taken than is used in your Country, or almost any where in this Kingdom; and unless your Servants were more willing to comply to new Methods, than, without giving any just Cause of Offence, I believe I may freely say, they are; for, tho' you might force them, it is at a little too great Distance from your House for you to be hourly over their Heads: Therefore I shall lay the Design chiefly for Grass.

Ground well drained, well prepared, and thereby brought into good Heart, and well laid down with Grass-seeds, will grow richer and richer yearly while it lies in Pasture; for, the more Cattle it can maintain at first, the more Dung and Urine will be left by them upon the Ground; the more that is left, the richer will it become, and the more Cattle will it maintain yearly: You know, the older Grass is, there is the more Salt and Substance in it, and it fattens the better.

In this I expect you'll agree with me; but since, as I apprehend, you cannot get Dung wherewith to put it into Heart and Condition to bring Grass from Grass-seeds sown, we must try what Art and Labour may do: For your Encouragement, your Expences shall be small, when compared with the Returns that may be reasonably expected. This is a chief Thing in all Improvements; for I have no good Notion of them, when a considerable free Balance is not fairly in View.

We see Dung enriches Ground, and makes both Corn and Grass to prosper, if the Ground be clean; if it be foul, it causes Weeds and natural Grass to grow luxuriantly, and they often over-top and
choke

choke Corns, and Grass from Grass-seeds; But, in the present Case, as taken notice of, it cannot be got: If it could, how does it do it? It does it not by entering into either Corn or Grass, in proportion to the Increase it causes; for you cannot but have observed, that, when you dung a Piece of Ground, the Quantity that it yields, more than otherwise it would, even the very first Year, is, if the Season be favourable, two or three Times greater in Bulk than all the Dung was. How does it do it then? This is a grand Consideration, and, I think I may say, the Knowledge of it is only a late Discovery; for the Antients seemed to have known little about the Pasture and true Food of Plants. Mr. *Evelin* appears to me to have been doubtful, and to have wandered in the Search; and Doctor *Woodward* to have wrote inconsistently. In one Paragraph he says, Each Plant *lets pass thro'* it the Food that it finds is not suitable to its own Nature; and, in another, That each leaves the unsuitable *all behind, lying quiet and undisturbed the while* for another Sort, and so on. Both cannot be true, says the ingenious Mr. *Tull*; who has set the Matter, in my Opinion, in a clearer Light than any who has wrote upon this important Subject.

Earth is the chief Food of Plants. Dung has a fermenting Quality, and by the Fermentation it divides the Earth into minute Particles. Water is a Vehicle, which being set in Motion by the Heat and Force of the Sun, conveys these Particles to the Orifices or Mouths of the spongy Roots of Plants. They receive such Parts as are small enough to enter. Those that are agreeable to their Natures and Constitutions, nourish them; the rest are thrown out by Perspiration. The Division and Pulveration give Liberty to their weak Roots to pasture, and extend themselves through the Earth for this Food; and they take what is thus made fit for their
Mouths,

Mouths, of whatever Sort it be, whenever it comes in contact with them.

I might write a whole Sheet illustrating this very Thing; but though the Account I have given is short, it seems to be just, and shows that Pulverisation is absolutely necessary. Truly we should be in a bad State, if it could be done by no other Means but by the Effects of Fermentation by Dung. But it is a happy Thing that it can be done, in most Cases, with less Expence, by Attrition by the Plough, or Contusion with the Harrow, Roller, &c. And if it be well done, the Way that costs least is the most eligible.

I shall presume a little more upon your Time, taking Notice, that the Earth is divisible *ad infinitum*; and that the more it is divided, the more it is pulverised, and the more open and porous you make it, the more internal Superficies it will have, the stronger will its Attraction of the heavenly Influences be, and the more fit Recipient of them will it become; so the more the Earth is plowed, it is the richer. Let me therefore advise you, to set the Plough to work. If any shall say, that you will break the Heart of your light Ground, you may tell them, that it is ridiculous, and now fully exploded; that, on the contrary, if you plow it until you pulverise it, it will participate of the Nature of strong Ground, go closer together, be heavier Bulk for Bulk, receive Moisture better, and retain it longer.

Your Ground being drained, engage two proper Servants, purchase six good Oxen, fall to work with them, before *Martinmas*; feed them well, and work as much as you can with them until the Middle of *February*, or Beginning of *March*, for a first Plowing.

I observe more Horses in your Country than I presume are well fed and employed. You'll get
some

some of them from your Tenants for a Time for their Meat. Cause them harrow what you have plowed; you cannot over-do it; and, as they harrow, follow with the Plough, the same Way you plowed at first, the better to break the Earth; and go as deep as you can. You are to study to have the second Plowing over by the Middle of *April*. Then harrow again with a Break-harrow, or larger Harrow than ordinary, and spare not: That is, cause the Harrows pull the Clods to Pieces, beginning always with the plowing and harrowing where you began at first. As soon as any of it is harrowed to the full, sow Vetches or Fitch-pease upon the Surface of the harrowed Ground. Then till them down, the contrary Way you plowed the two former Times, with a narrow and a very light Fur; but give no harrowing at all; or, if you find it necessary to give some, touch the Ground very gently. Perhaps it may be the Beginning of *June* before you have finished your sowing, but it is no Matter; for the later in the Season Pease are sown, the more they run to Straw, which is all that is wanted.

There is no doubt but Pease are of a meliorating Nature, and benefit Ground greatly when they run much to Straw. Some of the Reasons are: By the close covering of the Ground they rot the Surface, and retain the Dews, &c. which impregnate the Earth; they also feed much from the Atmosphere, being of an open and porous Substance; and less Food serves them than Plants of a hotter Constitution. When coming to swap, or to begin to pod, plow them down, and take Care that they be as much covered as possible: In order that they may be the more easily buried, roll them, to compress them before plowing.

Let the Ground ly in this Manner until the Spring, but touch it not till then with the Harrows;
for

for the rougher it lies through the Winter, the better. Then yoke your Harrows, and it is to be expected that it will fall under them to Dust; if so, the Battle is won, but pursue the Victory.

Plow the Ground again; and in *May*, or *June* at furthest, (chuse moist Weather) cause your Gardiner strinkle Turnip-seed upon it. If his Hand be dextrous, three or four Pounds will serve an Acre, which will probably cost only a Shilling or eighteen Pence *per* Pound. The Turnips are also of a meliorating Nature; but it is needless to assign Reasons for it to you who are so very intelligent. If you cause hoe them, it would be the best Way; but as there can be very few Weeds in the Ground, being new, and having suffered so many Plowings, there's the less Occasion for it, since the chief Intent is the enriching of the Soil. You may either feed Cattle upon the Ground with the Turnips in Winter, or allow them to rot. In either Way the Ground will be highly benefited. Or sow them in Drills, leaving Intervals four or five Feet broad, and Horse-hoe them as directed P. 6. which upon Trial will be found the best Way.

In the Spring following plow again; sow either Oats, Barley, Bear or Rye very thin, and give only a Touch of Harrowing. Then sow Grass-seeds from Hay-lofts, with a Mixture of the several Kinds of Clovers and a little Rye-grass, and touch again gently with the Harrows; but be sure you do not exceed. If you do, the Mould so well prepared, and made so very small, will be in Danger of being washed from the Grain, if Rain comes before it strikes Root fully; which in that Case will malt, then be scorched with the Sun, and killed; which is what no doubt you have heard called *Harrow-slaying*; tho' every one who has a bad Crop for this Cause does not know the Reason of it. Weeds, when Grain is thus killed, prosper the
more

more, the finer the Mould be made, it being still a sufficient Cover for their smaller Seeds; the more Seeds of Grain be killed, the Earth has the more Nourishment to afford the Weeds, and they grow the stronger.

If you cannot get Grass-seeds from Hay-lofts nearer, you may purchase them at *Edinburgh* for about 5 s. the Sackful. Cut the Corn high, and keep your young Grass carefully free from Cattle until the next Summer. The Corn, while it grows, shelters the tender Grass, and retains the Moisture of the Dews and Rains to nourish it; the high Stubble keeps it warm through the Winter, and, when it rots, becomes a Sort of Dunging.

I shall not doubt but that if every Thing I have said be carefully observed, exactly gone about, and well timed, or tided, as the common Expression is, you'll have a rich and beautiful Field of Grass, which must grow richer and richer while the Ground lies: For this Reason some bind their Tenants, that they shall not plow up old Pasture. The Directions offered will equally well serve for the rest of the whole low-lying Ground.

Now, let me first cast back my Eye, and take a View of the present State of your Ground; then consider the Effects of the Improvement when made; next, the Expence of making it; and lastly, take under Consideration what may be the most proper and profitable Way of spending the Grass.

With respect to the present State of your Ground, it is, and in Time past surely has been, of no great yearly Value in proportion to the Extent: But after it has suffered three Plowings, one before or in Winter, one in the Spring, and another in Summer; and after it has been exposed to two severe Harrowings to pulverise it further, and to the Benefits of the celestial Influences in these three Seasons, how can it be doubted, but fresh unexhausted
Earth,

Earth, lying level, will produce a Crop of Pease of the Kind that by Experience has been found to prosper in Ground where others would not thrive?

If the Crop prove good, as it reasonably may be expected, then by the plowing of them down, and turning the Ground again so soon, it receives a new Benefit of an early Harvest, whole Winter and Spring, and in part a Summer Fallow; by which, when it is harrowed and plowed again in *May* or *June* for Turnips, it must be all in Dust, and in fine Order for them, having been fermented by the green Pease plowed down for a Dunging. Wherefore the Turnips may be also expected to thrive; and if they do, whether they be ate, or allowed to rot upon the Ground, there is as little Reason to doubt but it will be in good Order for Grain and Grass-seeds; and so you may assuredly expect a good Crop of both.

If the Grain be cut high, that the Stubble may, from the Severity of the Winter, shelter your young Grass, (which, rotting with the Stubble upon the Ground, will still enrich it more,) and if the Field be kept free from Cattle until Summer; I will say that it is finely laid down, even without the Assistance of Dung; and that you may have great Expectations, with a small Expence, considering how cheap Servants Fees, the Price of Cattle, and the Provisions for both, are in your Country.

Perhaps you may think, or some may endeavour to persuade you, that less than all this Work may serve: But it is my Opinion, you should do every thing proposed, and make sure Work. Every Man does, or should reflect against himself, if he lays down Ground in bad heart, if he could have made it better; but I am pretty sure none ever did repent, and I dare say none ever will, that he laid it down with Grass-seeds, as rich and fine as he could, upon a moderate Expence. Why should
you

you grudge a little Labour or Loss of Time, when you may well have much more than the quadrupling of the present Value of your Ground in View, if you neglect nothing, and do every Thing as directed? There is no doing any Thing well by Halves; and it is but doing this once for all.

By this Time you will think that I have forgot your Shell-marl. Indeed I have not; I was only letting you see what I could do without it. In my Opinion, it could be used no sooner prudently; for your Ground, though lying in a level Bottom, is, in many Places, very unequal in the Surface: If you had laid the Marl upon it while it lay so, the Plowings and Harrowings would have filled the Hollows, and buried it there; so the Places that were at first high, would have wanted, or been altogether without it. Moreover, the Marl being a *pulvis*, and of a subsiding Nature, would have been washed down through the Soil so tossed, tumbled, and made open, and descended too deep to be of any great Use to the horizontal Roots of your Grasses; but now comes the proper Time to apply it.

Lay about a hundred such Sackfuls of it, as the small Horses in your Country can carry, upon each Acre of your Ground, and cause spread it with great Care. If it be equally laid on, and well scattered, I think that Quantity will be sufficient, the Marl being of the best Kind. It seems not improper to carry it in Sacks after it has been some time laid out of the Pit, and dried, when it will become very light; for Carts would cut your Ground, so well prepared, and made so soft.

It is an exceeding fit Time to use it; for being spread and exposed upon the Surface of the Ground, the Salts in itself, its Porosity, the Fineness of its Parts, and the many Superficies it has, have a certain Magnetism, by which they attract Nitre and

Virtue from the Air, which give it Life, or more Life.

If this Power of Suction or Attraction be the principal Quality of all Marl, and of this the finest Sort in an especial Manner; as concurring Reasons dispose me to think it is, what Folly would it be (or is it in those who do it) to turn Marl down presently after it is laid on, without allowing it to ly exposed to recieve these Benefits of the Atmosphere?

I am much of the same Opinion with regard to Lime, which Mr. *Houghton* says is free from all Salts: If so, I cannot well see how it can otherwise be of any great Use, except as a strong Attractor and fit Recipient of them.

The Marl, when the Rain washes it, thus impregnated, to the Roots of the young Grass, will nourish it wonderfully. I know it by many Observations. I have seen barren Leys made by it to have as strong a Verdure, even in the middle of Winter, as the richest Grass near the Ports of *Edinburgh*: You know when it is best to feed the Calf to make it a good Beast.

I thought to have offered particular Directions concerning the stocking of the Ground, either with black Cattle or with Sheep; but my Paper will not allow me to enlarge: Only, whichsoever of them you chuse, or for whatever Purpose you intend them, keep them good of their Kind, and be sure you do not overstock, especially in Winter. That has always many Inconveniencies and much Damage attending it.

Sir, It was not very needful to have said any Thing to a Gentleman of your Knowledge: Yet, as Thoughts may occur to one Man which may escape another of better Understanding, I hope I have observed some Things that may be of Use to you, at least I am sure, I have been well disposed: I nei-
ther

ther expect, nor would receive any Reward; but it may probably be in your Way to do me a Favour; for as I have had the Honour to be employed by Persons of Distinction, even of the first Quality, to give my Advice concerning the laying out and improving of their Grounds, have received their Approbation, and been generously rewarded, I have resolved that I will not refuse Business of that Sort when it offers.

I expect you will honour me with an Account of your Receipt of this, and a Note of your Improvements upon these my Observations, which I plead as a Discharge of the Promise you was pleased to ask of me, that I would write you my Opinion at Length. Heartily wishing you Success, I am, &c.

Sir Alexander's Answer to Mr. Maxwell.

S I R,

I Had the Pleasure and Advantage of your Letter, and I have been very attentively employed in considering what you wrote; but I am sensible my Want of Knowledge in these Matters, makes my Comprehension of your Meaning the slower. I have however ventured to write to Mr. Hope for the Opinion of the Society upon it; and I am satisfied, that it will be honourable for you to have your Thoughts examined by better Judges than I am, because I think you write as a Philosopher as well as a Farmer: That is, you search into the Nature and Reason of Things, without leaving any Room to doubt of your good Intention, as well as your Knowledge and Experience. I confess I always suspect a Man's Intention or Understanding, when he pretends to instruct by positive Precept, without reasoning and proving the Usefulness of his Doctrine from Nature and the Reason of Things,
of

of which every Man may in some Degree or other be a Judge.

I acknowledge the Debt you have laid me under, and I shall take the first Opportunity falls in my Way to repay thankfully. I am resolved to follow your Directions precisely. I am, &c.

The Letter to Mr. Hope of Rankeilior.

S I R,

THE Trouble of this is occasioned by a Letter I have from Mr. *Maxwell* of *Arkland*, giving me his Opinion and Advice how to improve a Piece of barren Heath which I showed him when he was in this Country. As his Opinion is founded on Nature and Reason, and as his Directions seem most obvious to the Understanding, I believe both are equally deserving of the Attention of the Society of Improvers; but as you are a far better Judge, I wish you would desire from him the Perusal of the Letter he sent me, of which no doubt he has kept a Copy. I am convinced the Performance deserves Esteem, and I hope the Society will think so. I dare not venture to touch any Part of the Subject particularly, because I really have little Knowledge about it; but, in the general, I have heard it observed, that there are two Kinds of Soil very different as to the Cause of their Unfruitfulness. The one is, that Sort of Ground which, being too close and stiff, is impenetrable by the Dews and Rains: The other, so loose and open as to receive, but not to retain the Moisture and Nourishment afforded by the different Elements. How far Mr. *Maxwell's* Doctrine, of pulverising and separating the Particles of the Earth, will serve for consolidating the one and opening the other, is a Question I must leave to you and better Judges

to determine. Mean time, as the Subject is of publick Concern, I hope you will excuse this Trouble from, &c.

Rankeilor's Answer, as Preses, by Order of the Society.

S I R,

I Have received your's, desiring the Opinion of the Society upon Mr. *Maxwell's* Advice concerning the Improvement of your Muir, and called for the Copy of his Letter or Memorial to you, which I have laid before the Society.

After considering the whole Scheme deliberately, it is by them recommended to me to let you know it is our Opinion, that the Principles he therein proceeds upon are founded, as you observe, on Nature and Reason: That the Propositions he lays down, the Observations he makes, and the Conclusions he draws from them are just: That the Directions he gives are highly reasonable, and that we cannot doubt but, if they be carefully and exactly followed, you will meet with all the Success, at the least, that he has said you may expect.

You most justly remark, that there are two Sorts of Soil, very different as to the Cause of their Unfruitfulness: That the one being close and stiff, is impenetrable by the Dews and Rains; the other so loose and open, as to receive, but not to retain the Moisture and Nourishment afforded by the different Elements; but we are convinced that Mr. *Maxwell's* Doctrine of pulverising and separating the Particles of the Earth, will serve for consolidating the one and opening the other, though it remained a Secret until Mr. *Tull* published his Book in the 1733. From him we have the following Account,

Account, which we think clears up the Matter fully; and Experience supports what he says.

“ Light Land being naturally hollow, has larger Pores, which are the Cause of its Lightness. This, when it is by any Means sufficiently divided, the Parts being brought nearer together, becomes for a Time, bulk for bulk, heavier, *i. e.* the same Quantity will be contained in less Room; and so is made to partake of the Nature and Benefit of strong Land, *viz.* to keep out too much Heat, and Cold, and the like.

“ But strong Land, being naturally less porous, is made for a Time lighter, as well as richer, by a good Division. The Separation of its Parts makes it more porous, and causes it to take up more Room than it does in its natural State; and then it partakes of all the Benefits of lighter Land.

“ When strong Land is plowed, and not sufficiently, so that the Pores remain gross, it is said to be rough, and it has not the Benefit of Tillage because most of the artificial Pores or Interstices are too large, and then it partakes of the Inconveniencies of the hollow Land untilled.

“ For, when the light Land is plowed but once, that is not sufficient to diminish its natural Hollowness or Pores; and for want of more Tillage, the Parts into which it is divided by that once, or perhaps twice plowing, remain too large, and consequently the artificial Pores are large also; and in that respect are like the ill-tilled strong Land.

“ Light Land having naturally less internal Superficies, seems to require the more Tillage or Dung to enrich it.

“ Artificial Pores cannot be too small; because Roots may the more easily enter that Soil that has them, quite contrary to natural Pores; for these may be, and generally are, too small, and too hard

“ hard, for the Entrance of all weak Roots, and
“ for the free Entrance of strong Roots.

“ Insufficient Tillage leaves strong Land with its
“ natural Pores too small, and its artificial ones too
“ large. It leaves light Land with its natural and
“ artificial Pores, both too large.

“ Pores that are too small in hard Ground, will
“ not easily permit Roots to enter them.

“ Pores that are too large in any Sort of Land,
“ can be of little other Use to Roots, but only to
“ give them Passage to other Cavities more proper
“ for them; and if in any Place they ly open to
“ the Air, they are dried up and spoiled before
“ they reach them.

“ For fibrous Roots (which alone maintain the
“ Plant, the other Roots serve for receiving the
“ Chyle from them, and conveying it to the Stem)
“ can take in no Nourishment from any Cavity
“ unless they come in contact with, and press a-
“ gainst all the Superficies of that Cavity which
“ includes them; for it dispenses the Food to their
“ Lacteals by such Pressure only. But a fibrous
“ Root is not so pressed by the Superficies of a Ca-
“ vity, whose Diameter is greater than that of the
“ Root.

“ The Surfaces of great Clods form Declivities
“ on every Side of them, and large Cavities; which
“ are as Sinks to convey, what Rain and Dew
“ bring, too quickly downwards to below the
“ plowed Part.

“ The first and second Plowings, with common
“ Ploughs, scarce deserve the Name of Tillage;
“ they rather serve to prepare Land for Tillage.

“ The third, fourth, and every subsequent Plow-
“ ing, may be of more Benefit, and less Expence,
“ than any of the preceeding ones.

“ For the finer Land is made by Tillage, the
“ richer it will become, and the more Plants it will
“ maintain.

“ It

“ It has been often observed, that when part of
 “ a Field has been better tilled than the rest,
 “ and the whole Ground constantly managed alike,
 “ afterwards, for six or seven Years successively,
 “ this Part that was but once better tilled, always
 “ produced a better Crop than the rest, and the
 “ Difference remained very visible every Harvest.

“ One Part being once made finer, the Dews
 “ did more enrich it; for they penetrate within,
 “ and beyond the Superficies whereunto the Roots
 “ are able to enter. The fine Parts of the Earth
 “ are impregnate throughout their whole Substance
 “ with some of the Riches carried in by the Dews,
 “ and there repositcd, until, by new Tillage, the
 “ Insides of those fine Parts become Superficies;
 “ and as the Corn drains them, they are again sup-
 “ plied as before: But the rough large Parts can-
 “ not have that Benefit; the Dews not penetrating
 “ to their Centres, they remain poorer: *Minus ha-*
 “ *bentibus minus datur, & vice versa.*”

It remains to approve of your taking Mr. *Max-*
well's Advice. We have heard him speak to most
 of the different Parts of Husbandry. He has wrote
 not a little that has been laid before us; and he
 merits to have it said of him, that his Knowledge of
 Soil, and of the different Methods of improving it,
 is extensive, and that his Sentiments are just. Was
 your Way of taking his Advice in Writ more in
 practice, we are fully satisfied, that it would
 prove highly advantageous to Gentlemen if they
 followed it, and the lower Sort would copy.
 As he is one of our Members, his Directions might
 the more naturally be laid before us, and we should
 be ready to make our Observations.

Thus, Sir, I have obeyed your Desire, by lay-
 ing Mr. *Maxwell's* Memorial to you before the So-
 ciety, and theirs, by communicating their Opinion
 concerning it to you. I dare say you are in the
 right

right Road. I doubt not but you'll walk in it diligently, and with a watchful Eye: If you do, Success will surely attend:

The Society expect an Account of it: We see, by the Swatch you have given, that your Reflections will be just, and the Matter well told. It shall be a Pleasure to me, for one, to hear from you, and to serve you if I can. The Society have ordered your Letter, his Memorial, and my Answer to you, to be printed along with their Transactions. I am, &c.

Memorial by Robert Maxwell of Arkland, for the Right Honourable John Earl of Stair, concerning his Lordship's Farms at Newliston.

B *Riest-mill Haugh*, lying West of the Road leading from the Stone Bridge to *Briest-mill Steps*, including all the Land betwixt the Mill Water-course and the Water, is a loamy Soil and dry, except when in Floods 'tis overflowed in Part by the Water of *Almond*: From the Mill-lead to the River 'tis gradually lighter.

The *Little Haugh*, betwixt it and the Mill, has more Cement, and is a better bodied Soil and cleaner: 'Tis seldom troubled with an Overflow, and tho' a light Soil, is stronger than the former.

The Ridges in *Briest mill Shot* lying South and North, are generally a well bodied Earth, of a good Spirit: The Ridges of it lying East and West, called the *Hip*, are more gravelly, and they grow gradually worse, from the Height and Plantation of Trees, towards the Ditch betwixt it and the *Clattering Shaws*; with this Difference, that the hollowest Places are the strongest and best Soil.

The *Little Haugh*, lying East from it, and betwixt the Road from *Briest-mill* to *Gate-side*, and the Road from *Briest-mill* to *Kirkliston*, called the *Hole*, is a deep, sandy Soil: The other *Little Haugh*, from *Briest mill* to *Liston-burn*, is more sandy, and still the more so the further East: The Haugh on the other Side of *Liston-burn*, lying betwixt the Road to *Kirkliston* and *Almond Water*, is also a sandy Soil; in Floods partly overflowed.

The Field bounded by *Liston-burn* on the South, *White-side Parks* on the West, the Road betwixt *Edinburgh* and *Linlithgow* on the North, and the Road betwixt *Kirkliston* and *Briest mill* on the East, is generally a rich Clay Soil.

The Field, in which are the Canals for watering Flax, lying East from and fronting the broad Walk of the Garden, called the Meadow, is a good Loam Westerly, but more sandy or gravelly Easterly; the *Clattering Shaws* are still more gravelly, and they are stony: The *Millrig Shot*, from the Quarry West to the Wall of the Garden, is a rich Loam: The *Stimp Stamps*, on each Side of the Road from the Avenue Foot to *Millrig Houses*, are a gravelly but kindly Soil.

The two *White-side Parks*, and the *Shield Fauld Park*, are a kindly good Ground, in some Parts strong, in others light, and in others participating of both these Natures: The two next Inclosures, lying directly West from the *Shield Fauld Park*, are, for the greatest Part, a light Kind of hollow Land: The Westmost Inclosure on the North-side stands more to Clay than either of the two last: The further West 'tis the more gravelly.

The two Inclosures, lying South from the West Farm House, are in some Places a good Loam, in others a good Clay: The Inclosures lying directly East from these, to the Park at the Back of the Stables, are generally a Clay Soil: This last Park, and the Park at the Back of the Mill and Slaughter-house,

are a good Loam: *Chesterlaw* is a kindly Soil, but neither deep nor strong, except in a few Places.

These are the most just Accounts I can give of the Soils of your Farms at *Newliston*, after pitting the Ground, and making the most careful Observations I could, in obedience to your Lordship's Commands.

A natural Fault of the strong Soils is the Smallness of their Pores; of the light, the Largeness of their Pores or Cavities. Plowing until both are well divided and pulverised, will make the strong, by opening it, participate of the Nature of the light; the light, by consolidating it, of the strong; and in a middle State they would be, both, in their greatest Perfection.

The Way to bring them into it is by Manure, Contusion of the Plough, or by taking meliorating Crops, or rather by Parts of the whole, as, jointly or separately, they divide and enrich the Earth.

The cheapest Way that the ingenious Husbandman can contrive to pulverise it, which will make it fruitful, and to free it of Weeds, is the best. But his Art is not so much discovered in bringing it into good Order, as in cropping it so judiciously afterwards, that it may continue the longer in that Condition, without new Expence of Manure, or losing Crops by Summer fallowing; this is done by varying the Crops wisely.

Pease, Beans, Clover, and all Plants of the Pulse Kind, are more or less Enrichers and Cleaners; Wheat, Barley, Rye, and Oats, and all Plants of their Kind, are more or less Wasters and Robbers of the Ground; the last are likewise Foulers of it, by giving Way to Weeds and Grass, which being the natural Product of every Soil, are more willingly nourished by it, than any Plant which it does not spontaneously produce; and if it (the Soil) be fed with Manure of any Sort, it will, while the
Weeds

Weeds and Grass remain undestroyed, act the Part of a tender Mother, and cherish and nourish them in proportion to the Food given her: The more that is given, the more they, by her kindly Nourishment, will be strengthened, and will thrust out or starve any Plant you force upon her, as Strangers and Intruders upon the Privileges of her natural Offspring.

If your Lordship's superior Judgment admits, that these Observations are just; then, with Submission, it follows, that the Way to make the most of Ground, by Grain or Grass from Grass-seeds sown, is, first, to pulverise it, and free it from Weeds, and natural Grass, as much as can be, and always thereafter to interject a meliorating, betwixt every two deteriorating Crops.

Some Soils may be more kindly to one Plant than another; but proper Degrees of Heat and Moisture, proper Husbandry, and proper Changes of the Crops, are the chief Things to be considered: For, in my weak Judgment, any Soil, having a Degree of Heat and Moisture natural to any Plant, will kindly nourish it, if the Soil be properly cultivated; tho' it must be admitted, that the Soils which are naturally richest, will produce best upon equal Culture.

Your Soils here are generally rich in their Natures, tho' many of them are of late, in your Lordship's Absence, much worn out and fouled, by taking deteriorating Crops running: Proper Husbandry, with meliorating Crops, will make them clean and rich, tho' you had not the great Stock of Manures, which shall be, herein, afterwards taken Notice of; but these properly applied, will hasten their Fertility.

The Crops which I think may turn to the best Account on your Farms here, when I consider their Situation and other Circumstances, are Wheat,
Barley,

Barley, a few Oats, Pease, Beans, Winter Tares, Clover, some Rye-grass, Flax, Cabbages, Turnips, Potatoes, and if your Lordship pleases, you may have Lucern, St. Foin, Carrots, &c. And I am of the Opinion, that, in the Course of your Husbandry of these Farms, Pease, Beans, or Winter Tares should always, except in the Cases after-mentioned, follow Wheat or Oats, Barley the Pease, Beans or Tares; and that Clover sown with the Barley should, after mowing it once, be plowed down for a Crop of Wheat or Oats, to be again followed by Pease, Beans, or Tares, and so on.

In this Method the Ground would be tenderly used; for as Wheat or Oats are known Robbers of Soils, and Encouragers of Weeds, so good Crops of Pease, Beans or Tares, are Enrichers and Cleaners of it. Those feed, in a great Measure, from the Atmosphere, and in proportion to the Porosity of their Stems and Leaves. They, especially the Pease and Tares, by their close covering of the Ground, and so retaining the Dews descending down through them into the Surface, and confining the subterraneous Heat from ascending out of the Earth, warm and enrich it; and, by rotting the Superficies, make it mouldy and a Sort of Manure.

Barley, as it stands only a few Months on the Ground, and as several Plowings are, or should be given for it, is, indeed, more gentle to the Land than Wheat or Oats; yet, in Comparison with any Plant of the Pulse or more porous Kind, it deserves the Name of Robber: For Barley, if it were common to sow it before Winter, and Wheat in the Spring, would waste the Ground more than the Wheat; the Length of the Time the Wheat remains in the Ground, (during which the Land untills itself, coalesces, and becomes of the Nature of uncultivate Earth, and the Weeds strengthen, ripen, and shed their Seeds, getting

no Disturbance from the Plow) being the chief Cause why Wheat is repute the greatest Robber : And therefore I humbly propose, that no robbing Crop should immediately follow Barley ; but that from Seeds sown with it, a Crop of Clover should be taken the next subsequent Year.

I shall next mention to your Lordship some of the Reasons, why I propose, that Clover should only be once cut, and the Ground thereafter plowed up immediately.

First, Wheat, Pease, Barley and Clover, are found to be the most profitable Crops of Grain and Grass, in use to be taken in this Country ; and it seems difficult to contrive a Plan by which any large Farm, or the greatest Part of it, can be kept in a constant Round or Rotation of these Crops successively, in any other Way, than by taking one Crop of the Clover only.

The simplest Husbandman knows, often to his Loss, the bad Consequences of putting his Ground out of *Run*, as he words it ; and if Prudence calls to keep it in *Runs* or *Rounds*, surely it requires likewise to keep it so by the most profitable Crops.

Secondly, Clover thrives best in a fine Mould, which is the Reason why I propose to sow it with the Barley, the Mould being generally made finer for Barley than for any other Grain : By allowing it to stand upon the Ground for more Years than one, the Particles coalescing, the Weeds and natural Grass prevail against it, and so it first starves, and then dies away, by which the Soil becomes barren, and the Ground foul.

Thirdly, When the Method proposed is taken, it enriches the Ground most ; for the Land has little Time to untill itself, the natural Grass to take Place, or the Weeds to strengthen their Roots, and few of their Seeds ripen before the Barley be cut, Clover being an early Plant : Besides, the

Roots

Roots of it are fullest of Juice, when the first Crop of it is ready for cutting, and when a Stop is then put to its Growth, by mowing and plowing up the Ground, the Water entering the Cut, the Roots rot quickly, and raise a sudden and strong Fermentation, which opens, divides, and enriches the Soil more than these Roots can do, when grown hard, dry and juiceless, being allowed to grow for three Years Crops, or upwards, as in the common Method.

I hope your Lordship will allow me to obviate an Objection, not to yourself, but to others, if they happen to see this Paper, that may possibly be raised against this Method of cutting Clover only once. It occasions, they'll probably say, an unnecessary Expence of Seed to sow for every Crop, since tho' only cut once in the Year, Clover on good Ground would yield, at least, three cut Crops, and strong After-growths: The Answer is, the Expence is not unnecessary, if my Method shall appear to be profitable.

Besides what hath been said to evidence this, I further observe, that after Clover has been three Years in Ground, I mean, three Years after the Year in which it was sown with Grain, 'tis difficult, if not impossible, to get a rich Crop of Wheat immediately following the Clover, without losing a Crop by Summer fallow; because by that Time the Ground will have become so stiff and hard, and bound with the Roots of the natural Grass and Weeds, which will have prevailed as the Clover died away, that it cannot be profitably sowed on one Plowing; and though two were given, the strong Surface, strongly stitched together with these Roots, will not in Time for sowing Wheat before Winter, unless the Ground is more tender than commonly Ground is, be rotted, and the Earth become so mouldy as is necessary for covering
the

the Seed properly, and for feeding the Plants, in such a Manner as can carry them through the Violence of the Winter Storms, vigorously on to a Crop, the chief Food of Plants being minute Particles; so Oats, the far less valuable Grain, takes usually Place of the Wheat.

According to my Plan, the Clover, allowed only to stand for cutting once, will, during all that Time, have sufficiently prevailed against both the natural Grass and Weeds, in dry, clean Land; and all Land where Clover is sown should be so naturally, or by Art be made such before it be sown. The thick Cover of the Clover in its prime, retaining the Dews charged with Nitre, confining the subterraneous Heat, and rotting the Surface, swells the Earth, divides the Parts of it, makes it mouldy, and enriches it; and so Wheat may unexceptionably be sown upon once plowing: Or, if in any Case it be adviseable to give it two Furs, if the Ground be soon plowed after the Clover is cut, and harrowed immediately thereafter, the more to prevent the Entrance of the Air, a Hinderance to the rotting of the Surface turned down, it, by the Middle of *September*, will by another plowing be reduced to a fine Mould, for the Pasture and Food of the Wheat Plants: But if one Plowing be thought sufficient, it may reasonably be delayed till the Clover grow up again, that it, turned down, may enrich the Ground by fermenting therewith.

With respect to the Expence of the Seed, I have taken Occasion to prove, I believe to your Lordship's Satisfaction and the Conviction of the Publick, in a Paper whereof you was pleased to receive a Copy in Manuscript, before it was published; that five Pounds of Clover Seed, or so, to an Acre of Ground, is a more reasonable Proportion than twenty, as directed in several Books of Husbandry,

bandry, and that it is hurtful to the Crop to sow such Quantities of it as usual: And I have no Reason to doubt, but every Husbandman who hath made the Experiment on Ground properly prepared, and hath taken Care that the Seeds were sown by a dextrous Hand, has proved this to his profitable Experience. Many have; but, what is the Charge of nine or ten Pounds to the Acre, when the Advantages of the Method I have proposed are considered, and when large Quantities of Seed are bought together by Commission, in the cheapest Way? It is next to nothing.

Lest what is said should not content People, led by Custom more than by Reason, who may say, we're sure of a good Crop of Oats, then of Pease, then of Barley, then of Clover for three Years; then of Oats, &c. again, and so on. I beg your Lordship's Patience, till for further Illustration I observe, first, That a good Crop of Wheat is better, by near the double, than a good Crop of Oats: But let me compare Crops with them for a Tract of Time, I shall suppose twelve Years: In these they get two Crops of Oats, two of Pease, two of Barley, and six of Clover; I get three Crops of Wheat, three of Pease, three of Barley, and three of Clover: Now, I submit it to your Lordship, whether in these twelve Years, near double the Profit will not be got from the Ground in my Method, that can be expected in theirs? and whether the Ground by my Husbandry will not be left cleaner, in better Tilth, and better Heart, than by their Husbandry, which is the common Husbandry, and tenaciously stuck to for that very Cause, but for no good Reason?

From the Foot of the Eastmost Stone Dyke, down *Brocksburn* to the Water of *Almond*, down *Almond* to the Water Course for your Mill, and down that Course to the Mill itself; from the Mill, along

the high Road leading to *Kirkliston*, on to the *Wallgate-foord*; from thence, up the Burn to the *Glasgow Road*; along that Road to the Stone Wall, inclosing the East Side of *Lindsay's Craigs*, and of the *Whiteside Parks*, on to the sunk Fence of the Garden; along it to the Stone Dyke South of it, and down it to *Brocksburn* again; and likewise the *Whiteside Parks* themselves, the *Sheild-fauld Park*, and the Park lying next West from the Park at the Back of the Stables: These Fields, the greatest and best Parts of your great Farm at *New-Liston*, can well admit of this Scheme of Husbandry, calculated by the Interjection of a meliorating betwixt every robbing Crop, to keep the Ground long clean and in Heart, if once brought into that Condition, without the Expence of Manures, (which, by Preparations and Carriages, are chargeable, tho' the Farm affords them) or without losing any Crop by Summer-fallowing; and also calculated to allow, without confusing itself, of a Substitution of other Crops in the Room of the Wheat, Pease or Clover; for in Places least fit for Wheat, such as the *Clattering Shaws*, Oats may be taken instead of Wheat: Beans, Winter Vetches or Tares, for Pease: Potatoes, Turnips, or Cabbages in place of Clover: Which Crop of Potatoes may be followed by Wheat; or the Potatoes, Turnips, or Cabbages by Flax, to be succeeded by Pease, Beans, or Tares, any of which leads back to Barley, Clover, Wheat, and Pease again in a Round or Rotation. Thus your Lordship sees, that a meliorating Crop still succeeds a deteriorating one annually, to attain which profitable End, I have contrived this Scheme.

The Husbandry of Winter Vetches or Tares, is indeed still rare among us, and was often attempted in this Country before it succeeded; but now, from profitable Experience it plainly appears, that we had our own Conduct, and neither our Climate

nor

nor Soil to complain of. Our Ground was either open, and Cattle, which they cannot suffer, ate them up; or it was not sufficiently drained, and in Winter the Water starved and killed them; or it was not fully prepared, or they were not sown so early, as to have strength to withstand the Winter Storms. These, and the like, are the Causes why they, or any Thing else, which will prosper in the Gardens, fail in our Fields.

Tares sown in *September*, in Ground properly husbanded, and they being preserved from Beasts, are found to be fit for cutting to feed Cattle in Barley Seed Time; or they may be made into Hay, and yet your Lordship knows they will take a new Growth, and in Harvest prove a Crop of Corn as well as of Straw. How profitable would this Husbandry have been, when your Cattle of all Sorts were sore pinched in that Season especially, tho' considerable Sums have been expended for Provisions for them? How much Grain might have been yearly saved thereby? and what a Flood of Milk would my Lady's Cows have given, had they been full fed with that Milk-breeding Plant?

I shall put the Management of the other Inclosures, lying West, into two different Views before your Lordship: The one is, to make them rich, clean, of a fine Mould, and then to lay them orderly down to Grass, with a Mixture of the several Clovers, and a very little Rye-grass, it being an Impoverisher and Foulter of Ground; but with the more of it, when the Ground may be wetish, or of a spouty Nature. In my Opinion, it is best to allow no Cattle to pasture upon the young Clover Grass the first Year, for their Feet trample it down, and Water, standing in the Holes, starves and kills it: Besides, when the Grass is not ate, it keeps the Roots warm, and, as it rots, becomes a Dressing to the Ground, and in that Way does more Service than when eaten.

I think

I think one Crop should be cut the first Year of these Grasses, that the Swaird may be able to bear Cattle, before they be allowed to pasture the Field, and that the Roots may not be dwarfed, the Stems being eaten down; for in proportion to the Strength of the Roots, will the Growth of the Grass be: But, if you please, one Crop for each of two subsequent Years, may also be cut, and Cattle fed upon the After-growths.

In this Way of using the one Crop for Hay, and the other for Pasture, two Occasions are taken to meliorate the Ground; for while the great Clover is growing for Hay, all the vegetated Seeds of Weeds, that, by their Nature, are not so quick Growers as the Clover itself, are choked and killed by it; and those that are able to struggle, are therewith cut down before they come to Seed, at least before it be ripe; so it is plain that there must be a great Destruction of Weeds yearly, while the Ground is under Clover thus managed; and, as is in part said, Clover meliorates the Ground as much, if not more than Pease, by rotting the Surface, retaining the nitrous Particles which come by the Dews, Rains and otherways, and by its falling Leaves, which, for Want of Air, dissolve into a slimy or oily Substance, which is washed into the Earth, while the Sun and Air have little Access to dry it up, the Clover standing thick upon the Ground.

Next, while Cattle are feeding upon the second Crop, and After-growth of the Clover, and on the tender young Sprouts of such Weeds as may be so hardy as not to be killed, being cut while in their Sap, the Ground must be enriched by the Dung and Urine of the Cattle; and tho' they should not incline to eat all the Weeds, even these they leave cannot, after such a Backset and Discouragement, come to Seed so late in the Season.

After this it may be considered, whether it will
be

be more profitable to continue the Fields in Grass for Pasture, or to plow them up, and take Crops of Grain and Grass alternately, *viz.* three Crops of Grain, Pease being the second, Barley the third, and three Crops of Clover.

If the Pasture Way, the second Method spoke of, shall be chosen for this the most distant Part, and least kindly Soil of the Farm, it will be improved by the Dung and Urine of the Cattle pasturing; and the longer it lies in Grass ate by Cattle fed on it, the richer it will grow: But if, after it has lain for Years, Fog should prevail upon it, or any Part of it, Dunghills compounded of proper Earth, and the rich Ingredients your Farm affords, will, if duly prepared and applied, cure the Disease, and further enrich the Ground, which will then feed the more Cattle, and the fatter; for the longer a Field, properly laid down and pastured, is kept in Grass, the richer both Field and Grass becomes, and the more Beasts it will keep, and the better; for the richer it grows, its Attraction and Suction of the heavenly Influences will be the stronger in Proportion.

The *Haughs of Briesmill* being in Part overflowed with the Water when it is high, I humbly think that these overflowed Parts should be laid down with a Mixture of the Clovers for Pasture, after the Swaird is become firm; for the Floods, as is the Case this present Year, wash away the best of the Mould, when in Tillage: Whereas, in Grass, that Part of the Field would be enriched by the Overflow, and the unarable Parts lying next to the River, could be the more conveniently pastured.

The Remainder of these Haughs may be employed with Flax, Barley or Wheat, (the Wheat sown under Fur) and Potatoes, Cabbages or Turnips, (or Carrots if you please) always interjected in the Horse-hoeing Way, betwixt either the Flax, the Wheat or the Barley, for the Reasons herein before given; and it may be very proper, for the
Carrots

Carrots especially, to trench-plow the Ground, this deep Soil admitting fully of this Husbandry : How clean would the Trench-plowing, with the Hoeings each alternate Year, make the Ground of Weeds, which force themselves into the Place, and greedily devour the Food of profitable Plants; and likewise, when allowed, propagate and increase yearly, as they shed their numerous Seeds? Or your Lordship may, again, have Lucern and St. Foin in these Fields, the properest Soils of your Farm for them, they being the deepest and driest.

I know that the *English* are generally of Opinion, that poor, gravelly, chalky, Limestone, flinty, or other Soils of little Value, are properest for St. Foin; but your Judgment, while here, in employing these Haughs for these Grasses, and the Force of the ingenious Mr. *Tull*'s Reasoning, command my Belief, that deep and dry Soils are fitter for them than any other, and that the richer Ground is naturally, or made, the fitter it is.

I never saw any Lucern or St. Foin in *Scotland*, on the Fields, that was good, except what your Lordship had on these very Haughs*. Your Way, you know, was to raise the Plants in Seed-beds, to plant them out in Rows, with Intervals betwixt the Rows, and to cause hoe them: But I shall humbly offer some Reasons why I believe they might have done very well in the common Way, with less Trouble and Expence.

I saw excellent St. Foin growing there irregularly: The Plants of it, thought of no Use, had been left in a Seed-bed, on the sandiest Part of the Haugh just by the Water-side, out of which these transplanted had been taken: It was surprising to see how prosperously this Grass had grown; the

* The Honourable *Hew Dalrymple* Esq; one of the Senators of the College of Justice sowed them, since that Time, in a large Field, and they are still prospering.

the greatest Part of it was longer than my Staff, tho' the Soil seemed to be poor, and tho' deep, as light as Earth can well be.

It seems hard to conceive why, if it, sown irregularly, be the best Improvement in *England*, as *English* Writers say, it may not be the best here, sown in the common Way too. It is true, Trials have been made in different Parts of *Scotland*, and several Disappointments have happened; the like was the Case with Winter Tares till of late. But, upon Inquiry, I believe it will be found, that either the St. Foin did not grow at all, which might be owing to the Badness of the Seed, or that it was not laid in the Earth at a proper Depth, or the like; for, if the Seeds ly much more than half an Inch deep, they will not be able to rise through the incumbent Mould, or, if they are not covered, then they are malted; that is, they send out their Roots which are killed by the Air; or if it did spring, and grow for some time, and thereafter died away, that the Ground was either not sufficiently inclosed, the Mould was not made fine enough, or that the Land was wet or weedy: There are plain and effectual Remedies for all these; and if they be applied, I shall not doubt but it will grow, and the better, the richer and deeper the Land be.

Your Land in these Haughs being deep and dry where it is not overflowed, will become, by the Trench plowing, and the Potatoe, Cabbage, Carrot, or Turnip Husbandry in the Horse-hoeing Way, a free Mould and rich; and the Husbandry of them being properly executed for a Course of Years, it will become as clean as any in *England*; and if so, I cannot doubt but both Lucern and St. Foin will grow as well in your Soil, as in theirs, of the same Nature and Quality. But to overcome the Difficulty concerning the Weeds, which seems to be the chief one, and to prevent the losing a
Design

Design by bad Seed, or any Error in sowing, it would be found to be no great Expence, where so great an Improvement is in View, to raise the Plants in Seed-beds, and to set them out in Lines nine or ten Inches asunder, and at about six Inches from one another in the Lines. How many Farmers in *England* plant Beans, which serve but for one Crop, and find their Account in it? Or, if the Planting shall not be approved, the Seed may be sown in Drills, leaving proper Intervals; in which Case the Plants should be singled in the Rows to reasonable Distances, the Intervals Hand-hoed, the Rows Hand-weed, and the Howing and Weeding continued, while the Growth of the Grass or Weeds shows that they are necessary.

If either of these Methods were taken, there seems to be small Danger, the Ground being proper, and made clean, fine, and rich by the Husbandry proposed, unless a Drought should happen at Planting-time, or soon after it; in which Case the Plants may be watered; for, if Weeds should rise and incumber or disturb the Plants, Hoeing by the *Dutch* Hoe, which is a cheap, and would be a profitable Work, will relieve them; or, even by early mowing down and carrying off the whole, the second Crop of the Lucern or St. Foin will probably overcome the Weeds; but this Method being dangerous, I do not recommend it, unless the Seeds were sown with the Broad-cast, which is far from being the most eligible Way.

Chesterlaw, now run out and exhausted by the injudicious Husbandry of the Tenants, lying in Grass, may soon be enriched, a great Part of it being improveable by Water, which can be commanded, and carried off one Place, and upon another, at Pleasure; for the Water may be made subservient to your Purpose, being a constant Manure at Hand, which will soon reward the Labour and Expence

pence : However, the Water should be managed with Care and Caution; for when Land Floods come, then it should be carefully and diligently dispersed upon the Ground: It is then foul and muddy, and, as it runs, deposites a rich Slime and fine Particles, which enrich Land beyond any Manure whatever, and the more, that they, when the Water is removed, make a strong Attraction and Suction of the nitrous Particles of the Air; but if it lies long upon Ground at a Time, it will chill and spoil the Grass: If it lies only two or three Days at a Time, it will greatly enrich the Soil without doing any Damage.

When by this Water-husbandry, and the Dung and Piss of the Cattle pasturing, the Ground is become rich, it may be plowed up for a Crop of Oats, then a Crop of Pease, and then laid down with Barley and Grass-seeds: A cut Crop of Grass may be taken yearly, for two or three successive Years, and the After-growths ate by Cattle: Then the Field may be turned wholly to Pasture, or another Course of the Grain Crops may be taken.

Such Parts as cannot at all, or without an extraordinary Expence, be watered, may be enriched in the taithing Way by the Cattle pasturing, folded in Hurdles or Flit-folds, or by Dung-hills compounded, for which there is proper Earth on the West March and other Parts, to be made up with the rich Ingredients which the other Parts of your Farm afford, in Manner herein after-directed.

I am aware that it may be observed, That according as I have schemed the Husbandry of your Farm, there will be yearly an immense Quantity of Hay, which, by some, may be thought to be hurtful to the Ground; but I desire that it may be remarked, that it is mostly from the great Clover, to which Cattle do great Damage with their Feet, and which is not so much fed by the Atmo-

sphere, when kept down by them and short, as when allowed to tiller or stool, and grow to its full Height.

In proportion to the Length and Strength of the Stalks of Clover, will the Length and Strength of its Roots be ; and the longer and stronger both be, the better will the Ground be covered and rotted, and the less Demand will this tap-rooted Plant make upon that Part of the Earth, where the horizontal Roots of Grain pasture for their Food, the greatest Part of the Nourishment of Clover allowed to blossom, being drawn from Parts far below, or received from the Atmosphere : Wherefore, and for other Reasons before taken Notice of, and more that might be given, were not these seemingly sufficient, Land is more improv'd by Clover when allowed to come to the Flower, tho' it be cut and carried off the Field, than it, the Land, would be, if the Grass were kept down by Pasture, even with the great Assistance of the Dung and Piss of the Cattle ; but, in this Case, the Clover must be good, and not allowed to grow above a Year or two.

Your Lordship will see, that I have calculated this Scheme of Husbandry for the Destruction of Weeds, as well as for fertilizing the Ground ; Pease and Clover being Cleaners as well as Enrichers ; and Care ought to be taken that as few as possible enter with Dung badly prepared, or with the Seeds of Grain or Grass, for in proportion to the Weeds that grow, will the Ground be wasted by them, and so much the less Grain or Grass will it produce, having the less Nourishment to yield to them.

They, the Weeds, steal in like a Thief in the Night, thrust themselves where Corn would grow, and dwarf it, drawing the Nourishment from it, or they choke and kill what grows beside them ; and, in wet Seasons, they hinder it to win or dry,
till

till 'tis often damaged, and sometimes rotten and lost.

The richer Ground is made, the stronger will they grow; and if they are once allowed to enter, the best Way to dispossess them, is by a well ordered Summer Fallow, or the Horse-hoeing Husbandry of Potatoes, Cabbages, Turnips, Carrots, Beans, or the like.

If by a Summer Fallow without a Crop, I think proper, in order to encourage their Seeds to vegetate, and then to destroy the Plants, which is the best Way to get quit of them, to advise the harrowing of the Ground, if dry Land, thoroughly after every Plowing: Thus the Earth, which is divisible *ad infinitum*, is the sooner and the more divided and pulverised; the more that it is divided, the more that it is pulverised, and the more open and porous that it is made, the more internal Superficies it will have, the stronger will its Attraction of the heavenly Influences be, and the more fit Recipient of them will it become; and this Method, which will therefore make the best Fallow, will likewise give an Opportunity to take out the Roots of perennial Weeds, to be burnt on the Ground, and the small Mould will invite the small Seeds of Weeds to grow; the smaller it be made, the more readily will they vegetate, and the faster will the Plants grow, which should be plowed down, the Ground again harrowed, more Roots taken out and burnt, and so on as long as the Season of their growing continues.

The better to get free of them in very foul Ground, the Fallow, neglecting a Wheat Crop, should be plowed up, to ly as rough and dry thro' the Winter as possible: Early in the Spring it should be harrowed fine, to encourage more Seeds of Weeds to grow, and more Roots, if any can be found, ought to be taken out: By the End of April

April there will probably be still a plentiful Crop of them, which being plowed down, and Barley with Clover sown, leads into any of the Methods of Husbandry before proposed; but Care ought to be taken that the Ground get no more harrowing after the Seeds are sown, than is absolutely necessary, lest the Seeds of Weeds, still undestroyed, should be excited by the Fineness of the Mould to get up before the Barley and hurt it: If they do, the Seeds of many of their Kinds will be ripe, and shed before the Barley is cut; so the Benefit of the Fallow will thereby, in part, be lost, and the Ground replenished with Weed Plants, which will grow vigorously therein, it being enriched by the Fallow.

With regard to the Largeness of the Quantity of the Hay, I say that Clover, on a proper Soil, properly cultivated and prepared, is a valuable as well as an enriching Crop; and I flatter myself that I have shown, that it is more enriching to the Ground, if it grow for one Year till it blossom, and be then plowed up, than if it was even kept short for the same Time by Cattle pasturing: I humbly think it would be a valuable Crop to your Lordship; for, by Contract for a Number of Years, I believe you might sell what remains after Home-consumpt, for 4 *d.* or 5 *d.* *per* Stone, which one Acre with another, if the Ground were in good Order, might yield more than 200 Stones. Surely it may also enter into the Consideration, that Hay is less subject to the Embezzlement of Servants than Grain, and that it is a necessary Part of Discretion, to regard the Condition Ground will be improved or reduced into by Crops, as well as the Money that may be drawn for them.

The *Whiteside Parks*, *Shield-faulds Park*, and the *Grass Parks* West from the Stables, ought, I humbly think, to be continued in Grass till the other Parts of the Farm be cleaned of Weeds, enriched, and brought
into

into the Course and Order of Husbandry proposed; then they may be broke up and husbanded for Grain, and Clover, the one following the other as aforementioned, and in Pasture they must yearly grow richer, tho' they cannot be so profitable as if properly husbanded for Grain and Clover interchangeably.

Now I have, with most humble Deference to your Lordship's better Judgment, and your Pleasure, proposed Methods of Husbandry, which, I think, may conduce much to clean your Ground of Weeds, mellow and enrich it, and to keep it long in that Condition, with small Expence of preparing and carrying out your rich Manures to it; but since your Farm has sufficient Funds of them in it, and is, in general, of a very good Soil naturally, I can see no Reason why it may not be made as rich and as profitable as any so much Land lying together in any Part of this Country, at an equal Distance from a large Town, Sea-port, or Place of extraordinary Consumpt, tho' far from being so under the present Management. I shall next, under your Lordship's Correction, direct the Preparation and Application of your Manures.

They are Lime, Pigeons, Poultry, Stable, Byre, and Sheep Dung, if you are pleased to allow the last to be housed, as shall be hereafter proposed; these may be either applied separately or compounded, and for Grain or Grass.

The Compost Way I most affect for the Execution of my Scheme: The Reasons will just now appear, when I offer my Opinion concerning the Manner of compounding them in Dunghills, and applying them thereafter.

The Middings, I think, should be made longways, according to the Directions given in the Answers to Mr. Scot of Rossie's Queries, P 26.

I shall

I shall next speak to the Application of these Manures, compounded or uncompounded: Here Regard is to be had to the Nature of the Soil to be dressed: If it be strong and cold, light Earth and hot Dungs, such as the Dung of Horses, should be used in the greater Quantities in the Composition; but if it be light and hot, the strongest and richest Clay, that can conveniently be got, and Cows Dung, ought to overbalance the other Ingredients: For tho' by the Fermentation in Middings properly prepared, and the working of them, the whole will be reduced to Dust; yet they will still retain their natural Qualities in part, and will, after the Application, gradually revert to the State they were in, either of Closeness or Porosity: By the Porosity and Heat of light Land, strong Land is divided and opened, and by the Closeness of strong Land, its Cement, and the Weight of the Body of it, light Land is consolidated: Thus by the Application of Soils, of these, or any other opposite and contrary Qualities to one another, the Fault of the one is made a Cure for the other: This is proved by every well ordered Experiment, even when Earth, uncompounded, is laid upon any Soil of a contrary Nature, tho' the applied Earth be of the worst Quality.

These Manures, prepared as aforesaid, may be applied to Ground and plowed in, or to the Surface after it is laid down for a Crop. Dressing upon the Superficies secures against an apparent Danger the other Method is exposed to; for Manures, whose Parts are fine, are of a subsiding Nature, and easily washed down through the Soil, and when laid under Fur, descend in a short Time too deep to be of any great Use to horizontal Roots; whereas, spread and exposed on the Surface, their Porosity, the Fineness of their Parts, their many Superficies, together with their Salts, have a cer-
tain

tain Magnetism, by which they attract Nitre and Virtue from the Air, which give Life or more Life.

If this Power of Suction or Attraction, be one of the chief Qualities of all Manures of finely divided Parts, as concurring Reasons dispose me to think, I submit it to your Lordship, if it be so prudent to turn them under Fur, without allowing them to receive, for a Tract of Time, these Benefits of the Atmosphere, as to expose them carefully spread upon the Surface, thus to be impregnated, and, by Degrees, to incorporate with, and enrich the upper Soil, and so to nourish the Plants the better.

If it be inquired how this is to be done, and to which Crops? I answer, to Wheat, when 'tis taken in the Course of the Husbandry; because it requires a greater Supply of Food than any other Grain, and proves generally, when it prospers, the most profitable.

The Ground having got the Seed Fur, the Manure, before prepared, ought to be carried out, spread and harrowed in with the Seed; or, when a black Frost comes, which will save the Ground from being cut with the Carts, or the Feet of the Horses, all the Farmers Strength should be employed to take out the Remainder, if any be; and Care should be taken that it be spread on the young Wheat as soon, and as equally as possible.

Barley seems to have the next best Title to the Manure, which may be carried out as aforesaid, and spread before sowing it and the Grass-seeds; or these Works may be done in Time of Frost upon the young Grass, and such a Dressing will keep it warm, and nourish it wonderfully: Where Potatoes are planted, it is reasonable to use Dung, and for them Litter or long Dung is reckoned good. Manure may also be used for any of the Crops aforesaid;

fore-mentioned; but I do not recommend the dunging of Ground, in the Season that Flax is sown on it, for one great Property of it is Equality, which cannot be well expected when the Ground is newly dunged, because it is very difficult to spread any Manure so artfully, as is necessary to make the Flax equal, if sown on Ground dunged immediately before.

The West-side of the *West Farm* has the most need of Manure, and is worst provided with Materials for it; I therefore propose to your Lordship, that your Sheep, when they do not go in the Garden, should be kept in *Chester-law* or there: These Fields have an easy Communication with one another; and one of the Houses might, on a very small Expence, be fitted up for putting them in at Night, with Hecks or Racks for holding Hay, or Pease-straw, or any Food for them which you may please to direct, when at Lambing, or any other Time it may be proper to feed them: Thus a vast Quantity of Manure might be yearly made, by Means of their Dung and Urine; for a *stratum* of Earth might be carried in to the House, which being covered with Straw, the Sheep would ly clean, till they made it dirty by their own Dung and Piss; then more Earth might be carried in, and more Straw laid on it, which when fouled by them, the whole might be carried out for a Dunghill.

By this Practice continued, an immense Quantity of excellent Manure might be obtained; for Lime, or any of the other Articles afore-mentioned, might be carried to that Middling, which, by mixing and turning the whole Ingredients as before proposed, would raise high Fermentations, at the same time that the Sheep, having Plenty without Doors, and being also house-fed on all necessary Occasions, could, in my Opinion, suffer nothing except thro' the Keeper's Fault.

The *Avenue*, the *Park* at the Back of the Stables, and the *Park* at the Back of the Milk and Slaughter-houses, with the Ground which cannot be plowed on the Water of *Almond*, *Brocks-burn* and *Liston-burn*, and about the *Lime Quarry*, assisted with cut Tares, cut Grass from the Garden, Clover, &c. seem to be the most proper Pasture for Lady Stair's Cows: The *Coach* and *labouring Horses*, I humbly think, ought to be fed constantly in the Stables, on Hay, Straw, Tares, Clover, &c. in their Seasons; and the young Cattle should go, Summer and Winter, among any of the Planting that is past Hazard, or in an Inclosure, or Inclosures, allotted for them: But I humbly submit all I have said to your Lordship's superior Knowledge.

I sent the above Memorial to Lord Stair, then at London. His Lordship honoured me by a Letter approving of it, and was pleased to say, You have hit exactly on my Sentiments.

His Lordship's Love to his Country: His Abilities and Zeal to serve it: His Knowledge of AGRICULTURE, and his strenuous Endeavours by Examples, and otherways, to promote it, as the indispensibly necessary Support of every other Interest or Design, publick or private, are well known: No doubt, it was for this Reason that he showed a remarkable Favour for all such as any Way endeavoured to forward the Success of it; and, had this great and good Man lived a little longer, I know (from what he generously, without asking, said to me, a few Months before his Death) that I would not have been lecturing last Winter at Edinburgh on AGRICULTURE, encouraged by Individuals only.

*Abstract of the Directions in the Dublin Essays,
concerning the Culture and Dressing of Flax.*

Strong, moist and clayey Loams, are the best Lands for Flax. They yield great Crops, particularly of Seed; which in the present State of the Linen-manufacture of this Kingdom ought to be first considered. Light Lands afford fine Flax indeed, but in small Quantities, little Seed, and that indifferent.

When Flax-ground requires Manures, those should be preferred which throw up the least Weeds. Of this Kind are, among others, Marl, Lime and Sea-wreck.

Upon the same account Ley is the fittest Land for Flax, which succeeds best always on fresh Grounds, provided they are tilled sufficiently.

These ought to be broken up in the Spring, that they may receive the Benefit of the next Summer's Fallowing, as well as that of the succeeding Winter. Three Plowings will be requisite to bring them into proper Tilth; and, if more be bestowed upon them, the Farmers won't repent their Labour.

In the second Plowing, at the Approach of Winter, the Ridges should be well thrown up, high and sharp, to turn off immoderate Rains; but, in that Plowing which immediately preceeds the Sowing, they must be laid as flat as possible, and much broader than for other Crops.

The Choice of Seed is of great Importance; and the thickest, oiliest and heaviest is the best. Changing it from any Soil to any other, keeps it from degenerating; from lighter Soils to heavier, considerably improves it. Constantly sown on the same Ground, it fails in a few Years.

The

The true Time for sowing is in *March*, the first good Season of that Month.

Even Sowing is of great Importance; and best attained when the Seedsman goes up the Ridge in a straight Line, delivers the Seed with his right Hand, then returns in the same Path, and throws it with the left.

Four Bushels is the full Allowance to the *Irish* Acre. If you sow much thicker, your Ground will afford you little Seed; if much thinner, your Flax will probably be coarse and stubborn.

Weeding can be seldom spared. Few Crops are clean without it, and no Flax-crop will be good which is not clean. You may weed Flax when it is two Inches high, and you may defer it without Danger till it is five. Sitting on it will not injure it, but treading will destroy it.

By the latter End of *June*, or the Beginning of *July*, Flax sown in *March* will probably be ripe. A ripe Crop inclines to a bright yellow, and the Seed upon Trial will be found firm and full, and of a lively brown. 'Tis then Time to pull your Flax, except it be designed for the finest Yarn. In that Case it may stand a little longer, till the Seed of some Bows begins to shed; for the ripest Flax works always best in the *Dutch* Method, and turns out finest from the Mills.

To make your Flax, lay it by Handfuls on the Ground in little Heaps a Foot and a half high, and turn the Heads of every Handful to the South, to receive all the Action of the Sun. In eighteen or twenty Days it may be bundled for Carriage, and drawn home.

There it must be laid safely and under Cover. It is a needless Trouble and an unnecessary Charge to stack it. The Flax-dresser should set about it in all haste, to prevent the Loss of the next, and the best Season.

To

To these approved Instructions to the Farmer, we shall add the following Directions, taken out of Letters sent to the Society by Correspondents who were pleased to conceal their Names.

As it is agreed, that the lightest Loams and the thickest Crop afford the finest Flax, it may be of use to let the Farmer know how he may save such Crops from lodging, as they generally do. The Method is a little expensive; but, if it answers, it will quit Cost very well. When the Flax is in the Ground, divide your Field into equal Squares, the Sides of which may be four or five Feet long; and at each Angle thrust a forked Stick steady in the Ground. When your Flax is some Inches high, lay from Stick to Stick a light cross Pole; and this will support the Flax, and hinder it from lodging. Some use Ropes instead of Poles; but they yield too much, and answer but imperfectly.

The Gentleman concludes, by assuring the Society, that this Method is in common Use abroad. However, we leave it to Experience to set a Value on it; and shall wait till then to encourage the Farmer to pursue it.

The second Direction wants less Time to recommend itself, and may probably be more readily complied with.

High Winds are so common in this Country, that there is Reason to apprehend, that the *Dutch* Method of laying Flax loose upon the Ground, would be attended with considerable Inconvenience. I believe the Method I pursue is safer. I gently tie each Handful as close as may be to the Heads; and then, spreading out the Ends, set it upright on the Ground. Three or four of these together, make one Stook; and into such small Stooks I divide all the Flax I have. They dry soon, because the Wind has free Access to the
Stalks,

Stalks, as the Sun has to the Heads, and the Rain cannot lodge in any Quantity upon them.

Ripling comes next. Two Men may work at every Instrument, by fixing it on a Bench, that one may sit at either End. Let them take small Handfuls at a Time, and draw the Flax through the Riple without Violence. Two Women to each Bench are necessary to hand the Flax in Bundles to the Riplers, to receive it from them again, to sort it according to its several Degrees of Length, Strength, Ripeness and Fineness, and to tie it loosely in little Sheaves.

After ripling, the Seed must be carried to the Granary, and the Flax watered. If possible, dispose of the whole into your Ponds together. The Summer, which draws hastily towards an End, is your fittest Season, and should be husbanded with Care. However, let nothing tempt you to use Bog-holes or running Waters. 'Tis better to delay till next Season, than discolour or damage all your Flax.

Cover your Flax, to keep it down, with the Slutch or Mire at the Bottom of your Ponds; or, till that be gathered in sufficient Quantities, with Clay, Rushes, Fern or Timber. From four to twelve or thirteen Days is the Time requisite for watering. After the fourth, examine your Flax daily, and be particularly careful not to let it ly too long. 'Tis a Mistake on the safer Side, to draw it too soon; for the Deficiency can be made up by Grassing.

In Grassing the shortest Grass should be preferred. Dry Sand-banks do well. On either the Flax must be turned every second Day, and generally lies from a Fortnight to three Weeks.

To dry your Flax, heat your Oven thoroughly; then let it cool, till a Man can stand in it without Uneasiness; fill it over Night, and your Flax will be ready for the Break next Morning. The Dirt
and

and Straws scutched out of the Flax in one Day, will heat the Oven for the next.

When you break your Flax, take Sheaf by Sheaf out of the Oven as you use it: It comes crisp under the Engine, works the better and more easily. 'Tis an Error to lay the Flax, as we do, as far as may be from the Joint. The nearer it is placed to the Centre of Motion in the Break, the more readily it splits, and the less Damage it receives.

In scutching, chuse the broad round Scutch: The square and narrow one, in use among us, cuts and destroys the Flax.

By the Time the Flax is scutched, and about the Middle of *October*, it will be Time to thresh the Seed.

This may be done by driving Horses backwards and forwards on the Bows, or by drawing over them a heavy Rolling-stone upon a smooth hard Floor.

Cleaning it requires more Nicety. To do it thoroughly, it must first go through the Winnow, which separates it from the Bows; through the Riddle next, to take out Straws, Stones, and larger Dirt; then successively through two different Sieves; the first bored with oval Holes, to let through the Seed, and nothing else of greater Bulk; the second closer, to retain the Seed, and afford a Passage to all smaller Bodies; and, lastly, through the Screen or Wire-harp, which frees it from all Dust.

When the Flax-dresser has thus cleaned his Seed, he should return to his Flax, and put it through the fining Mills. The Wheel in these turns alternately from right to left, and from left to right, twice each Way; and, according to the Number of these double Turns, the Flax comes out the finer, the smoother and the softer. Four-score such
Turns

Turns is the most that any Flax requires, and probably as much as it will bear.

In heckling, Women and Children should be employed from Choice. They work with greater Gentleness than Men, and Care and Tenderneſs are the main Excellencies in this Buſineſs. For the beſt Flax, four Sets of Heckles will be requiſite, each of them of a different Fineneſs. Through theſe it may be drawn ſucceſſively, and every Time with proportionable Caution. The laſt, whoſe Teeth is like the fineſt Needles, requires the utmoſt Skill, and ſhould be truſted with few Hands.

The following Letter ſhall conclude this Paper. You get it without Alteration or Apology.

“ It is but a ſmall Mite I have to offer to your
“ Approbation, but I am loth it ſhould be loſt or
“ buried without imparting, having ſeen the good
“ Effects of it. It is an Invention of one *Rigby*,
“ in the Service of the Right Honourable the Lord
“ *St. George*, in his Factory at *Connaught*. After
“ ripling the Flax, he ſent the Bows to the Mill
“ in Sacks, ordering the Millſtones to be ſet as
“ uſual for making Groats; then grinded the Bows,
“ and found it hurt not the Seed to any Value,
“ but left the Griſt fit for the Winnowing: By
“ which Means, in a few Days were ſaved up-
“ wards of twelve Hogſheads of good Seed, which
“ muſt have taken long Time and many Hands to
“ accompliſh otherways. The Millſtones may be
“ ſet at Diſcretion to grind as fine as you think
“ fit, but ſo as not too much to damage the Seed.

P. S. The Bows are ſuppoſed to be dry.”

*MEMORIAL for James Spedding, Esq;
of Armathwate-Hall, in the County of Cum-
berland, by Mr. Maxwell.*

HAVING had the Honour to be called by you, and other Gentlemen into *England*; having waited on you through your Farms of *Armathwate* and *Burthwate*, and having examined and considered the Nature of their Soils, the Manner of their lying, and other Circumstances; we have found the Farm of *Armathwate* to be in part Meadow Ground, in part Upland, and in part Woodland: It is inclosed, divided into many beautiful Fields, and I hope fully drained; but, the Weather having been, for a long Time, excessively dry, I can have the less Certainty concerning the Draining; only I observe that you have proceeded with regularity and Judgment, and have employed good Workmen, for the Work testifies it.

The large Extent of Meadow Ground in *Armathwate* is, almost totally, a good and deep Clay Soil, with Moss [Peat-earth] above it: The Moss, giving little Grass, and of bad Kinds, is generally of the Thickness most to be desired; that is, of such a Depth as, after paring and burning, enough of it will remain for mixing with the Clay by subsequent Labour, which by incorporating the Moss with, and so opening the too dense and compacted Particles of Clay, will greatly improve the Staple.

I hope you will allow, that the Soil of your Meadows is justly described; and, so far as you have yet wrought, I think your Husbandry of them almost unexceptionable; for, on the Field you pared and burnt last Year you have exceeding good Wheat in the broad Cast, and Potatoes in the Horse-hoeing Way, only the Intervals betwixt your Rows are too narrow: That Part of it which is in
Barley

Barley does not indeed promise a good Crop this Year, tho' the Soil is the same as where the Wheat grows; but to me the Reasons are obvious.

Barley requires a finer Mould, Earth more pulverised, than is necessary for Wheat: Your Wheat had taken Root in the Ground, had covered it before the dryest and hottest Weather came on; and, in proportion to that Covering, kept out the Drought, and retained the Dews with their fertilizing and fructifying Salts: Whereas, the Drought came severely upon the Barley in the Infancy of it; the Ground, lying naked, suffered all the Severity of the Season, and the Soil being Clay never before plowed up, and so unpulverised, became so hard, that the weak Roots of the Infant-barley could not enter it, far less pasture in it for Food.

How then could your Barley prosper? Or why should the good Qualities of that Part of your Ground, or the Unfitness of it for Barley be suspected on this Account only, that the Season proved unfavourable for that Grain, for the Reasons aforesaid, and because the Ashes got by the burning, and the Lime which you had added, concurred and co-operated with the Dryness and Hotness of the Season, to burn the Plants, and disappoint your Expectation?

To avoid such a Misfortune hereafter, I think you should, for the Reasons forementioned, sow Wheat on these Meadows for the first Crop, after paring and burning. Plow in the Ashes first; then, after the Intervention of a Week or two, harrow until the plowed Earth be well broke and mixed with the Ashes, and in the proper Season plow the Seed-fur; but, after the Seed is sown, harrow no more than is necessary to cover it: Be sure you do not plow deep, but make the second Fur deepest; for Ashes are of a subsiding Nature, and apt, by injudicious Management, to go deeper
I i into

into the Soil, than the horizontal Roots of Grain do: When plowing for the second Crop, go a little deeper, to raise the subsided Ashes, which, by this Time, will be so much incorporated with the Ground, that the Danger of their subsiding further is not much to be feared.

Before I offer my Opinion concerning the second Crop to be taken from these Meadows, let me observe, that different Crops have different Effects upon the Ground they grow on: Wheat, Rye, Flax, Oats, and Barley, are Robbers and Impoverishers; Pease, Beans, Potatoes, Turnips, Clover, and others, are Enrichers: This being the Case when these enriching Crops are properly managed, the Husbandman should have more regard to the State his Ground must be in after a Crop, than to the Value of the Difference betwixt a robbing and enriching one, tho' the Robber was always the most valuable, as it often is not; wherefore it must be bad Husbandry to take robbing Crops of any Kind successively, and good, to interject always a meliorating betwixt every two of the deteriorating Sorts.

I was, indeed, the other Day told in your hearing, that Clover is neglected in this Country as a Robber: This surprised me; yet, I offer my Opinion positively, that the red Clover (when the Husbandry of it is good, and the Crop of consequence proves a weighty one) is not only an Enricher, but a Cleaner of the Ground it grows on, for which I have offered Reasons which I think just and incontestable, P. 95.

I make no doubt but you might get even three successive robbing Crops from your Meadows after paring and burning; but what tolerable Crop could you get the next Year without dunging? And where could you find Dung for so large an Extent of Ground, and your Uplands too? I therefore

fore propose, for your second Crop, to plant in part Potatoes, and in part Beans, both in the Horse-hoeing Way, and to sow Pease on another Part, with the broad Cast: The Pease might also be sown in the Horse-hoeing Way; but, when they grow long, they overly the Lines often into both Sides, and mar the plowing of the Intervals. You will soon discover which of these Crops proves most profitable, take that on the same, or a like Soil, upon other Occasions; for any of them properly ordered and managed will much, if not altogether, relieve your Ground, and bring it back to the Fertility it was in, when the Wheat was sown on it.

That your Ground may be the better prepared, and the more enriched for these or any of these Crops, plow up the Land presently after the immediately preceeding Crop is off it, the Fur being made a little deeper than for the first Crop, to raise up the Ashes that may have subsided, that they may be the more incorporated with the Ground by the subsequent Labour, which, as before observed, is the surest Way to prevent their subsiding further, and so to obtain the greatest Benefit by their Effects: Whatever Proportion of them might, without this cautious Management, subside so below where the Roots of your Plants could reach, that Proportion, if not totally lost, would do little Service.

I beg Leave to detain you, until I remark some of the notable Effects of plowing presently after Harvest: I do it the rather, because I guess, from what I have heard said in this Country, some may be of Opinion, that the Trouble may be saved.

By plowing it so soon, you will have the best Chance to get it plowed dry, which all good Husbandmen endeavour, and the plowed Land will get the more of the Sun and the Benefit of a Fallow:

Fallow: Besides, the plowed Ground (which ought to be as well water-furred as possible) should be left unharrowed, and as rough as possible through Winter and until the Spring, that the Clods may then fall to Dust, which is the chief Food of Plants; and that they will most probably do so, if they suffer Frosts, tho' the Clay or other Soil be very bound, is plain from this: Water frozen employs more Space than it does unfrozen, and so the Water in the Clods when frozen distending the Parts of the Earth whereof they are composed, these distended Parts will either fall without any Force when Thaw comes, or will be in such a tottering Condition, that they must crumble when touched with the Plough or Harrow. Moreover, Ground plowed before Winter receives, during that Season, great Benefits from the Atmosphere, and Impregnation from the Nitre that comes with Snow, &c. and what greater Good can be done to Ground by Dung, or by any Means whatsoever, than to divide the Parts of it, to reduce it to as small Dust as possible, and at the same Time to impregnate it with Salts, and by the celestial Powers and Influences, that these fine fructifying Parts, entering the Mouths or Orifices of the spungy Roots, may feed the Plants?

I would gladly know from any Man, what other Good, crude, unpulverised Earth, the Parts whereof are so gross, that they cannot enter the Roots of Plants, can do to them, than to keep them upright and steady: The hardest Pebbles can assist in this; and so Pebbles, and Earth that is not reduced into a Capacity to enter the Roots of Plants, are only of the same Use to them.

I have in a publick Manner struggled to serve Mankind, by inculcating this Doctrine of Pulveration, this Doctrine of Doctrines in Husbandry: I have, following Mr. *Tull*, exploded the vulgar Errors

rors concerning it, and the foolish Conceit that even light Land is hurt by much plowing: My Letter to Sir *Alexander Mackenzie*, P. 201, & *seqq.* treats on this Subject: In my Letter to the *Clergy of Scotland*, concerning the Improvement of their *Glebes*, which I published by itself, I resumed a Part of my Arguments therein mentioned, and presumed to preach this Doctrine to the whole *Reverend Brethren* of the Church of *Scotland*, even from the *Holy Bible*; and have there shown that it is their Duty, considering the Importance of the Matter, to do so too unto their Hearers, in some Week-day Sermons annually, and also to enforce it by their Practice. I recommend these Papers to your Perusal, for I hope they will confirm you in the Principles you have received concerning Pulveration; Principles that are fundamental and the Ground-work of all good Husbandry, and in contradiction to which there can be no good Husbandry.

I get myself restrained, and I return. As soon in *March* as dry Weather offers, but while the Earth retains some Moisture, harrow the Ground until the Clods are broke, the Mould cannot be made too fine, the finer it be made it is the better. By, or before the Beginning of *April*, have in readiness such a Quantity of the clear skin'd round red, or of the Leather Coat Potatoes, as you think will serve for planting such a Part of your Field as you design to employ with that Root, for they are thought to be the best and most profitable Kinds of it: Cut them into proper Sets, &c. as directed Page 167.

As to the Preparation of such a Part of your Field as you design for Beans, the Manner of Planting, Hand and Horse-hoeing, and other Matters concerning them, they are all so near the same as I have proposed for Potatoes, that it can be no Difficulty to a Gentleman of your Capacity to
make

make the few Variations that are necessary: I should trifle if I told you how to sow Pease in the Broad-cast Way.

After the Potatoes, Beans or Pease are off the Ground, plow it presently for the Reasons taken notice of: Water-fur it, but do not harrow it till the Spring for the Reasons mentioned. In *March*, or the Beginning of *April*, harrow it well, plow again, and sow the Seeds of Barley or Flax, or Part of each, with the red Clover Seeds upon the whole of your Field, after one or two Plowings, as you may see Occasion: Flax is by far the most profitable of the two Crops, and you will find Directions concerning it, P. 242 & *seqq.*

With regard to the sowing of the Clover Seeds, ten Pounds is the Quantity for an Acre according to Custom; but I have made it appear, in my Essay on Moss and Grass from Grass Seeds sown, herewith published, that five or six Pounds will be sufficient if the Dexterity of the Sower can be depended on.

Next Summer, when a great Part of the Clover is blossomed, cut it for Hay, or House-feeding as you have Occasion: But observe carefully, that you do not let it stand until it bring Seed; for while Plants are feeding, they are great Robbers, and the riper the Seed becomes they are the more voracious, and throw out their Juices the more profusely, and so exhaust and rob the Ground the more violently: This has been proved by Experiment.

Mr. *Hope* of *Rankeillor* says, " That having one
 " Year taken two Crops of Hay from one of his
 " natural Grass Inclosures in *Hope Park*, and letting the Grass stand till the Seed ripened, being
 " advised, that the Hay, which he designed for
 " Sale, would weigh the better, he found that it
 " exhausted the Ground as much as Oats, that the
 " Land

“ Land did not recover its Strength till it was well
 “ dunged, and that he had lost more than he had
 “ gained by the Weight or Quantity of the Seed,
 “ the Juices of the Grass being exhausted, and the
 “ Hay being the worse, and not so nourishing. A
 “ Stone and an Half in the Flower, (*says he*) is
 “ better than two Stones come to Seed, and I
 “ would also have had more Hay.”

This curious and ingenious Gentleman observed in *Holland* and *Flanders*, &c. where they cut their Grass, from Grass Seeds sown, three or four Times a Year, and their common Grass Grounds twice, that they never let any of their Grass come near to Seed, but cut it all in the first Bloom; because, if they allowed it to come more forward, it would not only weaken their Ground in proportion to the Time it stood longer, but likewise lessen the Strength of the Hay: I made the same Remark when I went to these Countries in Prosecution of the Knowledge of Agriculture.

When Grass is come to Seed, a great Part of the Juices and Strength of the Plant are gone, and both the Earth and Roots are much exhausted; whereas, if the Juices of these strong Roots are only stopt, to facilitate and forward the second Crop; and, if a second Crop be also taken in the same Way, whereby the Juices are only curbed, to forward a Crop for Foggage; Nature is thereby eased and assisted, that would otherwise waste itself, bringing the Matter to Seed; and the Eddish being ate by Cattle, the Juices are again preserved from wasting themselves, and the Roots from being exhausted: This is very suitable to what Mr. *Tull* relates concerning *St. Foin* Hay, and as what he says regarding it, may very well be applied to all Sorts, I shall lay a Part thereof before you.

“ Before the making of it be described, (*says*
 “ *he*) the proper Time of cutting it ought to be
 “ determined,

“ determined, as upon that depend the Degrees
 “ of its Excellency; (besides upon the Weather
 “ which is not in our Power) for tho’ all Sorts of
 “ this Hay, if well made, is good, yet there is a
 “ vast Difference and Variety in them. The seve-
 “ ral Sorts may be principally distinguished by the
 “ following Terms, *viz.* The *Virgin*, the *Blossomed*,
 “ the *Full grown*.

“ The first of these is the best beyond all Com-
 “ parison; this must be cut before the Blossoms ap-
 “ pear; for when it stands till full blown, the most
 “ spirituous, volatile, and nourishing Parts of its
 “ Juices are spent on the next Generation; and
 “ this being done all at once, the Sap is much de-
 “ pauperated, and the *St. Foin* can never recover
 “ that Richness it had in its Virgin State: And tho’
 “ when in Blossom it be literally in the Flower of
 “ its Age, it is really in the Declension of it. If
 “ it be said, that what is not in the Stalk is gone
 “ to the Flower, it is a Mistake; because much
 “ the greatest Part of its Quintessence perspires
 “ thence to the Atmosphere.

“ And moreover, that all Vegetables are in
 “ some Degree weakened by the Action of conti-
 “ nuing their Kind, may be inferred from these
 “ Plants, which will live several Years, if not suf-
 “ fered to blossom; but whenever they blossom,
 “ it causes their Death, tho’ in the first Year of their
 “ Life; for in Plants, (as Dr. *Willis* observes in
 “ his Animals) Nature is more solicitous to con-
 “ tinue the Species, than for the Benefit of the
 “ Individual.

“ Part of a drilled *St. Foin* Field was cut in the
 “ Beginning of *May* before blossoming, and from
 “ the Time of cutting until it was set up in Ricks,
 “ being about ten Days, the Sun never shone on
 “ it; but the Weather was misty. At last it was
 “ forced to be gathered together, for fear of Rain,

“ so

“ so green, that out of the largest Stalks one might
 “ wring milky Juice; yet by making the Hay up
 “ in little Ricks, and drawing up a Chaff Basket
 “ (*a Sack full of Hay or Straw will do as well*) in the
 “ Middle of each, its Firing was prevented; but
 “ it looked of a dark Colour by heating, and was
 “ the best Hay that ever I had.

“ By cutting before blossoming, is not meant
 “ before one Blossom appears, for here and there
 “ a Bud will begin to open, with a red Colour,
 “ long before the rest; therefore, when we per-
 “ ceive only a very few Blossoms beginning to o-
 “ pen (perhaps not one of a Thousand) we re-
 “ gard them as none.

“ This Hay, so cut before blossoming, has kept
 “ a Team of working stone Horses round the Year
 “ fat without Corn, and when tried with Beans
 “ and Oats mixed with Chaff, refused them for
 “ this Hay. The same fattened some Sheep in
 “ Winter, in a Pen with only it and Water, they
 “ thrived faster than other Sheep at the same time
 “ fed with Pease and Oats. The Hay was weigh-
 “ ed to them, and the clear Profit amounted to
 “ 4 Pounds per Tun [*which is 20 Hundred Weight,*
 “ *each Hundred 112 Pounds, or 2240 Pounds, which is*
 “ *112 Stones, at 20 Pounds to the Stone, and makes*
 “ *the Hay upwards of 8 Pence halfpenny Stone Weight*
 “ *foresaid.*] They made no waste, tho’ the Stalks
 “ were of an extraordinary Bigness, they would
 “ break off short, being very brittle.

“ The other Part of the Ground was afterwards
 “ cut in the prime of its Flower; and made into
 “ Hay by the Heat of the Sun, without Rain or
 “ Mist: This came out of the Ricks at Winter
 “ with a much finer Colour, and as fine a Smell
 “ as the Virgin Hay, but did not come near to it
 “ in fattening Sheep, or keeping Horses fat at hard
 “ Work, without Corn, as the Virgin Hay did.

“ The next and last Sort of *St. Foin* that is cut
“ only for Hay, is the *Full grown*, the Blossoms
“ being gone, or going off; this also is good Hay,
“ tho’ it falls short by many Degrees of the other
“ two Sorts.

“ In a Day or two after *St. Foin* is mowed, it
“ will, in good Weather, be dry in the upper Side;
“ then turn the Swarths, not singly, but two and
“ two together; for by thus turning them in Pairs
“ there is a double Space of Ground betwixt Pair
“ and Pair, which needs but once raking; where-
“ as, if the Swarths were turned singly, that is,
“ all the same Way, suppose to the *East* or *West*,
“ then all the Ground would require to be twice
“ raked, at least more of it than the other Way.

“ As soon as both Sides of the Swarths are dry
“ from Rain and Dew, make them into little Cocks
“ the same Day they are turned, if conveniently
“ you can; for when it is in Cock, a less Part of
“ it will be exposed to the Injuries of the Night,
“ than when in Swarth.

“ Dew being of a nitrous penetrating Nature,
“ enters the Pores of those Plants it reaches, and
“ during the Night possesses the Room from
“ whence some Part of the Juices is dried out;
“ thus it intimately mixes with the remaining Sap,
“ and, when the Dew is again exhaled, it carries
“ up most of the vegetable Spirits along with it,
“ which might have been there fixed, had they not
“ been carried away in that subtile Vehicle. If
“ *St. Foin* be spread very thin upon the Ground,
“ and so remain for a Week in hot Weather, the
“ Sun and Dew will exhaust all its Juices, and leave
“ it no more Virtue than is in Straw; therefore,
“ it is best to keep as much of our Hay as we can
“ from being exposed to the Dews while it is
“ making.

“ When

“ When the first Cocks have stood one Night, if
 “ nothing hinder, let them double, treble, or qua-
 “ druple the Cocks, according as all Circumstan-
 “ ces require, in this Manner, *viz.* Spread two or
 “ three, or more together in a fresh Place; and
 “ after an Hour or two turn them, and make that
 “ Number up into one Cock; but when the Wea-
 “ ther is doubtful, let not the Cocks be thrown or
 “ spread, but enlarge them, by shaking several of
 “ them into one, and thus hollowing them to let
 “ in the Air; continue increasing their Bulk, and
 “ diminishing their Number daily, until they be
 “ sufficiently dry to be carried to the Rick.

“ This I have found the most secure Way.
 “ Though it be something longer in making, there
 “ is much less Danger than when a great Quantity
 “ of Hay is spread out at once; for then a sudden
 “ Shower will do more harm to one Acre of that,
 “ than to twenty Acres in Cocks; and the very
 “ best Hay I ever knew in *England*, was of *St.*
 “ *Foin* made without ever spreading, or the Sun’s
 “ shining upon it. This Way, tho’ it be longer
 “ ere finished, is done with less Labour than the
 “ other.”

Cut the Clover twice for Hay or House-feeding,
 or you may use the second Crop for Pasture: In
 the Beginning of *September* plow the Ground,
 sow Wheat, water-fur well, and go on, taking Po-
 tatoes, Beans or Pease after the Wheat, Barley or
 Flax sown with Clover Seeds, after any of them:
 Use the Clover as aforesaid, and sow Wheat after
 it as directed: Thus you see you will have yearly
 thereafter the Crops before-mentioned, and if you
 take them in the Order set furth, without altering
 the Scheme in any respect, your Ground will grow
 richer by the Dung you may allow it from your
 Dung-hill, and by the Effects of the Labour pro-
 posed, and of the Potatoes, Pease, Beans and Clo-
 ver,

ver, which are all both Cleaners and Enrichers ; and Clover is the greater Cleaner and Enricher, if it is allowed to stand for one Year only, for the Reasons given Page 223.

If you shall not incline to be troubled with so many Servants, as the continuing of your Plowing-husbandry, on the whole of your arable Fields, would require, and are therefore disposed to use the greatest Part of your Ground in Pasture, after it is sowed with Grass Seeds ; then, when this you intend, sow the red Clover, white Clover, and Rye-grass Seeds mixed on the Ground, but sow them separately ; for the Clovers being weightier and smaller Seeds than the Rye-grass, they cannot be sowed equally at one and the same Time ; but then you cannot make near so much of your Ground as by the Plowing-husbandry proposed ; for, after two or three Years, Grass Crops, tho' eat, and much more if mowed, diminish greatly, on a Clay Soil especially, which, by lying untilld, will coalesce, and grow so hard and dense, that the Roots of the Grass will find Difficulty to pasture in it, and as they are straitned for Food, the Grass itself will in proportion decay ; yet, if you have Patience, the Dung and Urine of Cattle will, by Ferment, relax the Parts of the Earth near the Surface, and so giving more Pasture, and thereby more Food, will encrease the Quantity of the Grass, and the Quality of it will still grow better, as the Ground grows richer.

Now, I proceed to your upland arable Inclosures of *Armathwate*: They are a Loam inclining in general to Clay, in some Parts to Gravel, and in a few Places to Sand. Drive these Parts of them, which you are Summer-fallowing, to Dust by the Plow and Harrow ; and, by Exposures, impregnate them with the Benefits of the Atmosphere and celestial Influences, of which they will have the
more

more or less Attraction and Suction, in proportion to the Fineness of the Particles into which the Earth is reduced.

Where you may incline to have Turnips, make Drills by the Plow at exactly five Feet Distance from one another, as directed for the Potatoes: Into these Drills, which ought to be made with a deep Furrow, lay Dung, or Manure from your compounded Dunghill, and thereupon plow back the Earth, that was plowed out, and lay thereto another Fur, to cover the Dung the better: This being done, throughout the whole of that Part of the Field where you design to have Turnips, give these new plowed Furrows a single Stroke with a Garden Rake or a Harrow, to smoothe the Earth; then, until you get a drill Plough or drill Barrow, make a small Drill with the Mouth of a Garden Hoc, or the End of a Pole, on the Top of the Lines of Dung; or a Wheel-barrow pushed along on well pulverised Ground, will make a Drill sufficient for receiving the small Seeds of Turnips at a proper Depth; which done, drop in Field-turnip Seed into the whole Drills: You can hardly sow the Seed too thin: Then, with a Garden Rake, or the Mouth of a Hoe, bring back the Mould upon the Drills containing the Seeds. So soon as they are up, and distinguishable from the Weeds, single them in the Rows, to about eight or ten Inches asunder, by the Hand-hoe; then Horse-hoe, as directed Page 6. the oftner the better; only, you must take Care to keep the Earth off the Turnips, tho' it is fit to lay it as near them as you can: If Clods fall on them, they must be relieved.

If they do not grow, you must get better Seed; If they grow, and the Fly take them, which rolling when they are sown, or sowing Soot on them when coming up, will probably prevent, you must presently, without Plowing, make a
Drill

Drill for the Seed, and sow again as directed. Tho' the Seed be good, and the Turnips escape the Fly; yet it may happen that it, in some Places, may be laid at too great a Depth, and so be buried, or too near the Surface, and so may not grow for want of sufficient Cover; or tho' it do grow, the Plants may wither away if too high placed: In any of these Cases, plant Coleworts in the void Spaces; the Husbandry directed for the Turnips is also proper for them, and they will make an agreeable Change of Food for your Cattle.

The Turnips and Coleworts being spent, dung such Parts of the Field as you think may have need of it; and, after one or two Plowings, as you see cause, sow Barley and the red and white Clover and Rye-grass Seeds, since you would have your Fields as soon in Pasture as properly you can; or, if you please, you may, where your Ground shall want no dunging after the Turnips, sow Flax-seeds with the Grass-seeds: The Reason against dunging Ground in the Season whercin Flax-seeds are sowed on it, is, Dung cannot be so equally spread, at least it seldom is, but it causes the Flax to grow unequally. Directions for sowing these Seeds, cutting the Grass, winning the Hay, and managing the Flax until it is fit for spinning, is herein before given.

If you suspect that your Ground is not so fit for Flax, Barley or Bear, as for Oats, tho' I see no Cause for the Suspicion, if it is properly prepared; yet, I know no Objection against sowing the Grass-seeds with Oats, if you plow the Ground until you reduce it to a fine Mould: You will, perhaps, be told that this is unnecessary, because uncommon, for Oats; but consider, you are also sowing Grass-seeds, which indispensibly require it, and your Oats will be the better in proportion to
the

the Plowings and Exposures you give the Ground for them.

Many other Ways of preparing your Ground, before sowing Grass-seeds, might be set furth; but, as the Method proposed is good, I am unwilling to swell my Paper to such a Length, as the describing them would require. If you please, you may plant Potatoes, Beans, Cabbages, or Coleworts; instead of the Turnips: The Husbandry for the Turnips is equally fit for them, and the Effects of any of them will be near the same to the Ground, or you may sow Vetches in *April*, for by late sowing you will have the more Straw, which will do good to the Ground by covering it; but if you plow in the Plants when blossoming, you will dung it, and a cheap Dunging it will prove. Thus, Sir, I also conclude my particular Directions concerning the Improvement of your upland Fields of *Armathwate*.

As you have many Materials for compounding Dunghills, beside Stable and Byre Dung, I think you should use them in that Way, for which you have Directions Page 26. Some Variations may be necessary, but to make them properly, can be no Difficulty to you, and your Dunghill, being wrought and ordered, as is there directed, their Parts will be made fine, and they will be rich; but, lest this Pulvis or Lime, which is likewise of a subsiding Nature, should, when tossed and tumbled by the Plow and Harrow, descend too deep in your Ground, made fine and open by the Husbandry proposed, to be of full Use to the horizontal Roots of your Plants, unless Caution be used, in Manner before recommended, I advise you to reserve as much of both, as you well can, to be applied to your young Grass from Grass-seeds sown: A proper Time for this is in Winter, when the Frost is so hard, that your Wheel-carriages cannot
cut

cut the Ground: When these Manures are spread and exposed on the Surface of it, their Salts, their Porosity, the Fineness of their Parts, and their many Superficies, have a Magnetism, by which they draw Virtue and Nitre from the Air.

Mr. *Houghton*, by a chymical Trial, could find no Salt in Lime; but, without founding on this Experiment, several concurring Reasons dispose me to think, that the Power of Attraction and Suction, which it and other Manures, whose Parts are fine, have, is the chief Quality of them; and if so, it must be wrong Management, to turn Lime, or any other fine Manure (which has few, if any, Juices to be exhaled) down presently after it is laid on the Ground, without letting it ly exposed, to receive the Benefits of the Atmosphere, which will impregnate it greatly: When the Rain washes it into the Ground, it will be the more enriched, and, in your Case, your young Grass will be much nourished, and in proportion to the Nourishment it gets in its Youth, it will thrive during Life.

It is highly profitable to apply Manure to young Grass, for the Field will keep the more Cattle: The more it keeps the first Year, and the better they are fed, the more Dung and Urine will fall from them, and therefore it will keep more Cattle and as well the second Year; and, for the same Reason, will continue to keep more and more yearly, until the Parts of the Earth, coalescing, obstruct the Pasture of the Grass Roots; in which Case, the Ground may be plowed for Oats the first Year, the Husbandry of it before directed may be followed for the second and third, and with the Seed for the third Crop Grass seeds may be sowed as aforesaid.

Several Parts of your Farm of *Furthwait* want draining, and some Fields of it should be divided; but, what you have done at *Armathwate*, shows
you

you have no Need of Directions concerning these Matters. The Soil of the arable Land of *Burthwait* is so near the same with the upland arable of *Armathwait*, that to direct the Improvement of the first, would be, in Substance, to repeat what I have said concerning the last, the upland arable of *Armathwait*; so I leave it to you to apply the Rules offered for the one to the other, well knowing that you can do it properly.

With regard to your Woodlands, I refer you to Mr. *Evelyn's* Discourses on Planting and Pruning, and particularly to what he has taken from Mr. *Lawson's* Papers: "How many *Forests* and *Woods*,
 " (*says he*) wherein you shall have for one lively
 " thriving *Tree*, four (nay sometimes twenty-
 " four) evil thriving, rotten, and dying *Trees*;
 " even whilst they *live*, and instead of *Trees*
 " Thousands of *Bushes* and *Shrubs*! What Rotten-
 " nesses! What Hollownesses! What dead Arms!
 " What withered Tops! Curtailed Trunks! What
 " Load of Moss! Drooping *Boughs*, and dying
 " *Branches*, shall you see every where! And those
 " that in this Sort are in a Manner all unprofitable,
 " *Boughs*, cankered *Arms*, crooked, little and short
 " *Boals*: What an infinite Number of *Bushes*,
 " *Shrubs*, and *Scrags* of *Hazels*, *Thorns*, and other
 " unprofitable Wood, which might be brought by
 " dressing to become great and goodly *Trees*! Con-
 " sider now the Cause.

" The lesser *Wood* hath been spoiled with care-
 " less, unskilful, and untimely Stowing, and much
 " of the great *Wood* also. The greatest *Trees* at
 " their first rising, have filled and overladen them-
 " selves with a Number of wasteful *Boughs* and
 " *Suckers*, which have not only drawn the Sap
 " from the *Boal*, but also have made it knotty,
 " and themselves and the *Boal* mossy for want of
 " Dressing; whereas, if in the prime of Youth, they
 " had

“ had been taken away close, all but one Top,
 “ and clean by the Bulk, the Strength of all the
 “ *Sap* should have gone to the Bulk, and so he
 “ would have recovered, and covered his Knots,
 “ and have put furth a fair, long and streight Bo-
 “ dy, for *Timber* profitable, huge, great of Bulk,
 “ and of infinite last.

“ If all *Timber Trees* were such, (will some
 “ say) How should we have crooked *Wood* for
 “ Wheels, Coorbs, &c.

“ *Answer.* Dress all you can, and there will be
 “ enough crooked for those Uses.

“ More than this, in most Places, they grow so
 “ thick, that neither themselves, nor Earth, nor
 “ any Thing under or near them can thrive, nor
 “ *Sun*, nor *Rain*, nor *Air*, can do them, or any
 “ Thing near, or under them, any Profit or Com-
 “ fort.

“ I see a Number of *Hags*, where out of one
 “ Root you shall see three or four (nay more,
 “ such is Men's unskilful Greediness, who desiring
 “ many, have none good) pretty *Oaks* or *Ashes*
 “ streight and tall; because the Root at the first
 “ Shoot gives *Sap* amain; but if *one* only of them
 “ might be suffered to grow, and that well and
 “ cleanly pruned, What a Tree should we have
 “ in Time? And we see by these *Roots* continual-
 “ ly and plentifully springing, notwithstanding so
 “ deadly wounded, What a Commodity would a-
 “ rise to the *Owner* and the *Commonwealth*, if
 “ *Wood* were cherished and orderly dressed? The
 “ waste *Boughs* closely and skilfully taken away,
 “ would give us store of *Fences* and *Fewel*; and
 “ the Bulk of the Tree in Time would grow of
 “ huge Length and Bigness; but here, me-
 “ thinks, I hear an unskilful *Arborist* say, that
 “ Trees have their several Forms even by Nature;
 “ the *Pear*, the *Holly*, the *Asp*, &c. grow long in
 “ Bulk,

“ Bulk, with few and little Arms : The *Oak* by
 “ Nature broad, and such like. All this I grant ;
 “ but grant me also, that there is a profitable End
 “ and Use of every *Tree*, from which if it decline
 “ (tho’ by Nature) yet *Men* by *Art* may (nay
 “ must) correct it.”——It will be easy for you to
 improve and apply these Hints, when the Hurry
 by your Building and other Undertakings is over.

I have, Sir, overlooked some Things, thinking
 them too trivial to be taken Notice of, to a Gentle-
 man observing and penetrating, tho’ of short Ex-
 perience in Husbandry ; and I please myself with
 the Thought, that *Armathwait*, where your de-
 lightful Country Seat is, and *Burthwait* will, in a
 short Time, be improved in an exemplary Man-
 ner, by the unvariable Prosecution of the Directi-
 ons I have offered ; and that your free Returns of
 Profit shall exceed what you, or any other Mer-
 chant could make, in the same Time, of the Sum
 necessary for your Improvements, by Trade ; such
 Returns as shall excite you to improve other
 Farms of your Estate.

Accidents may affect a Farmer’s Means, and dis-
 able him for Farming ; but you may allow your-
 self to be persuaded, that Husbandry never was,
 nor never will be unsuccessful, except for want of
 the Sum necessary for carrying it on, or for the
 want of a proper Plan, or else, for the Neglect of
 executing it fully and seasonably. Husbandry
 half done, may probably give much less than
 quarter Profit ; trifled with, it must bring Loss ;
 but, if it be right planned, and fully and proper-
 ly executed ; Where can the Merchant, or Manu-
 facturer, or Company of either of them, be
 found, who can show me, that any Manufacture
 or Trade can on an equal Stock, and in an equal
 Time, be so profitable as Husbandry may, their
 different

different Risques being considered? To show that they cannot, I offer myself single, to enter the List with them, and to submit our Schemes to the best Judges can be found.

*Memorial for William Brownrig, Esq; M. D.
in Whitehaven.*

I Have carefully viewed the Bog, your late Purchase, and a Part of your Estate near *Keswick*; read your Letter concerning it with Attention, and considered your Map, showing the Method you think best, for securing it from the Out-bursts of *Braithwait-Beck*, and discharging the Water that arises in itself.

You remark that the Field, lying betwixt two small Rivers, is pretty level; yet, that it declines gradually from *Braithwait-Beck* down to *Poe-Beck*; that the Soil is exceeding deep and very rich, being probably a Collection of Mud, as it lies at the Bottom of the Valley of *Keswick*; that it now appears to be a Mixture of fat marley Clay and loamy Earth, with Peat Moss in several Places on the Surface; and that this Ground is, in its Nature, in no respect worse than the rich *Broadmyre Meadows* adjoining, tho' it hath been most unaccountably neglected, and suffered to be chilled with the Water of *Braithwait-Beck*, flowing into and lodging upon it, which hath caused Rushes and other destructive Plants to over-grow it.

As Fencing and Draining ought to be the first Operations in Agriculture, you purpose to execute both at once, by making a deep and wide Ditch along the Side of *Braithwait-Breck*, at about five Yards Distance therefrom, to make a Bank between the River and it, with the Earth to be dug out of the Ditch, and to cover the Bank eight
or

or ten Inches deep with the Gravel in the Channel of the Water; which Bank, so made, will be a good and useful Road to all the Ground. You justly observe, that the River will be thus deepened, and its Banks strengthened, and that, if the Water shall, at any Time, overflow the Bank, it will be carried off by the Ditch, which will likewise assist the Fence.

Since you intend to cut several deep Ditches cross the Ground from the other *Beck* to the *Ditch* forementioned, which will divide it into several Inclosures; and as these Ditches, if cut through the principal Bogs and Springs, will near dry the Ground, it will want few covered Drains.

Your Description of the Soil and present State of the Field is so just, and your Intention concerning the Banking and Draining is so reasonable and proper, that I can only add, that I see no Necessity to make the Bank as broad at the Top as the Bottom; The more it slopes it will stand the better; besides, by sloping it both from the Water and the Ditch, Earth will be afforded, to raise the Bank higher, than if made perpendicular, and it will stand the better.

The more you find it reasonable to slope the Bank, the higher it will be, and the higher it is, the better will your Security against the Water be, if the Breadth at the Bottom be in proportion to the Height: As, I fear, the Water in Floods rises to a great Height, your Bank should be made high and firm, so early in the Spring as you may suppose the Danger of Floods to be over, that, before they return, the Turf on the Side of the Bank, nearest the Water especially, may be grown together into one solid Body; for from thence comes almost all the Damage to your Ground, and a full Security against the Water being obtained on this
Side,

Side, there is no Difficulty of discharging what arises in the Field.

To secure your Ground from any outward Water, except *Braithwait-Beck*, seems to be an easy Matter; but, to do that effectually, it is necessary that you begin the banking of this *Beck*, at the End nearest *Keswick*, before it touch the Side of your Ground; for bursting out there, it comes through another Field into yours, and does great Damage to both, so you will, surely, get Liberty to do it: I know, there is a Ditch at the Head of your Field, to carry it into *Poe-Beck*; but it is not sufficient; and tho' it may, perhaps, be made seemingly effectual, yet, you will allow, that it is wiser to hold a known and a dangerous Enemy out, than to allow him Entrance into the remotest Corner, in hopes of defending against him so far advanced.

This Bog, by effectual Draining and subsequent Improvement, may be made more than ten Times its present Value; but stagnating Water is a Bar to all good Husbandry: The bad Effects of it were never more visible than on this very Field. I never saw so good a Soil drainable on a moderate Expence, so destroyed with Water, and so overgrown with Rushes and other aquatic Trumpery: I thought there had not been such a Spot in *England*: Fifty Acres, and upwards, of, perhaps, as good a Soil as is in it, inclosed, and near two Market Towns, rented at four Pounds ten Shillings, and dear of it in the present Condition!

To make your Bank against *Braithwait-Beck* the more effectual, I doubt if you should, on any Consideration, make the Edge of it just by the River Side: I think you should leave about eighteen Inches betwixt the under Part of the Bank and it, and, leaving the Allers and Willows there, to grow, you should plant of the same Kinds be-

twixt

twixt the Bank and the River, in the Blanks betwixt these Bushes; those growing, and those to be planted, when grown, will, I hope, defend your Bank very much from the Force of the River, and from the Boards of Ice, which coming down with Floods after Frost, and the Melting of the Snow on the great Mountains above, might otherways wound it.

These Observations, which could not escape your own Consideration, I leave to be corrected and improved by you, and proceed to treat of the Husbandry of the Field, as freed from stagnating Water. On extraordinary Occasions, notwithstanding all that can be done, some of the Field may be flooded for a Day or two; but, as it will go off so soon, and can have no Current, it will, as in other Cases, do more Good than Harm.

The Husbandry proper for breaking up this Field is, doubtless, paring and burning: Here is Soil, the lower the better, for an immense Deepness: Here is useless Fog to be destroyed: And, here is a Covering of monstrously grown Rushes, and other aquatick Trumpery to be got quit of. The Ashes which these, with the clayish Earth immediately under the Fog, will afford, must surely be sufficient, their Quality being considered, to heat, enrich, and impregnate a Soil, that can have no other Fault, than that of being chilled by a Stagnation of Water.

Here, if I were writing for another, it might be proper to speak of the Nature, Qualities, and fertilizing or destructive Effects of Salts, and of the Causes why they sometimes enliven, and at other Times destroy, not only the Seeds of Plants, but Plants themselves, and even strong Plants; but I will not pretend to teach a Master, a learned Gentleman, who has given a sufficient Testimony, in his

his *Book on Salts*, of his superlative Knowledge of them.

Should you sow Barley on this Field for the first Crop after paring and burning, if a severe Drought should come during the Infancy of it, the Ground, lying naked, would suffer all the Rigour of the Season, and (the Soil being Clay never before plowed, and so unpulverised) would become so hard, that the weak Roots of the Infant Barley could not pasture through it for Food, and the Ashes would concur and combine with the Dryness and Hotness of the Season, to burn your Plants, and ruin the Crop. To avoid which, I think you should sow Wheat on this your clayish Soil for the first Crop; for Wheat does not require so fine a Mould, Earth so much pulverised, as Barley doth, and Wheat sown in the End of *August*, or even in *September*, will not, probably, suffer Drought in its Youth: It may be expected, that it will cover the Ground in a good Measure, before hot and dry Weather come in the Spring; and, in proportion to that Covering, it will keep out the Drought, and retain the Dews with their enriching and fertilising Salts.

The Soil of your Bog, and of your Brother in-law, Mr. *Spedding*, his Meadows at *Armathwait*, is so near the same, that, I think, the Directions I offered to him for plowing and cropping these Meadows, as in the preceeding Memorial, are equally proper for this your Field. I exerted myself to direct the least expensive and the most profitable Husbandry for him; striving to do better for you, my Strength might be insufficient, and, my Attempt failing, I might do worse.

*Memorial for Gabriel Griffith of Widop, Esq;
Merchant in Whitehaven.*

I Have viewed your Estate of *Widop* carefully:
To know the Soils the better, I have turned
up the Turf in many Places of every Field, and
considered Matters as well as I could.

I think your Mountains, if you could get them
right managed for the Difficulties after-mentioned,
are as good for grasing Sheep, as almost any I have
seen. The large inclosed Field thereto adjoining,
called *Hag* and *Horse-field*, would be very fit for
Hogs and two Year old Sheep, if kept free from o-
ther Cattle, and you may get far greater Profits from
these Mountains and that Field, than has hitherto
been, or can ever be got, till the present Manage-
ment is altered.

In your Sheep Walks, and not in yours only,
but in all the Sheep Grounds I have seen in *Cum-
berland*, I observe Sheep, Horses, Black Cattle, and
even Geese, all going in a mixed Stock: How un-
reasonable is this? Does not the Grass arising from
the Dung of Horses, Geese, and Black Cattle, rot
and breed other Diseases in a breeding Stock of
Sheep? In fattening Grounds, Reasons may be gi-
ven for a mixed Stock. No Grass is lost, one Kind
eating what arises where the Dung of another had
fallen, and the lean, when fat, being always sold
off, the Sheep being on the Ground for a short
Time only, are seldom infected; but, in the Case
of a breeding Stock, it is most unreasonable, and
the Practice of every good Storemaster is against it,
for the Reasons aforesaid.

You will probably say, you cannot help it; for,
by Custom, or something worse, Commoners have
a Privilege of pasturing their Horses and Black

M m

Cattle,

Cattle, to the Back of the Dikes or Hedges of their Neighbour Commoner's Inclosures, and this even when these Commoners Sheep can be kept off; which, as I am informed, is your Case, with respect to all the Parts of these Mountains that are within Sight from your House.

This is an unlucky and destructive Custom, and shows the Ignorance, or Inconsiderateness, or the Self-disregardfulness of those who introduced it. If you can purchase it off, at any Price that is not very immoderate, surely you should do it: If you cannot, feed your own Horses, Cows, and Geese there likewise, or get Clover for House-feeding your Horses and Cows, as shall be herein after shown, that they may be kept out of their present and usual Pasture, the *Hag* and *Horse-close*, which is your own free Property, and is, as before-mentioned, very fit for Hogs and two Year olds, which are more subject than older Sheep to be affected with the Diseases which the Grass arising from the Dung of Horses, &c. occasions; but the proper and full Use of this Inclosure will never be got, till its Fences are effectual against Sheep.

When they are made so, let no Beast enter it, from some time in *May*, until the Lambs, you design to keep for upholding your Stock, are taken from their Mothers: When they are, put them into it till rigorous Weather comes; then bring them into a House or Houses which you have got on the Ground, and may well spare for feeding them in the Night, and let them go in the Day time in *Lowther Park*, (in which no Cattle should be allowed to pasture in Summer or Harvest, that the Grass may be good) and in all the Inclosures betwixt your House and the Mountains, except such as shall from Time to Time be lately sowed with Grass-seeds: If they be allowed to go in these, they will cut the tender Swaird with their Feet, and, eating the

the young Grass too close, will kill it, or mar the Growth of it.

When your Lambs are taken out of the *Hag* and *Horse-close* as aforesaid, put your two Year old Sheep into it: In stormy Weather you may give them Hay in the Field, or you may put them, thro' the whole Winter, into a House in the Night Time, and feed them.

I am glad that by my advising to house, which I think a good Way on many Considerations, when Care is taken to use the Sheep tenderly, and Provision is made for feeding them, I have not had Occasion to differ from the Practice of the Country; for, by housing your Lambs or Hogs, you may make an immense Quantity of excellent Manure, and more, if you house your two Year olds also. For this Purpose of making Manure, by housing these your young Sheep, you can get Clay, Moss or Peat Earth, and other Materials, with a Superabundance of Ferns from Fields near your House: Cut, win, and stack them as Hay; you shall be directed how to use them.

You will have other Advantages, than on account of the Sheep, by cutting the Ferns: Your Grass will not be covered and rotted by them; they will serve for Litter for your Horses and Cows, if dried and kept as aforesaid, and so increase the Quantity of your Manure. You complain, and say Lime is only to be got at a great Distance, and you know not how to get other Manure: Here are many and good Materials, and you shall be told how to make Manure with them, how to use it, and likewise how to make little of it serve all your Purposes well.

Put Hecks or Racks in your Sheep-houses, for holding Hay to feed them; then lay a *Stratum* of Clay, Lime, Moss, Ashes from Earth of the Common, and of Leaves of Trees, whereof you
may

may get great Quantities, &c. The more your Articles are in Number, and the more different their Natures and Qualities be, the better will your Manure prove; and above all lay a Bedding of the Ferns. Thus your Sheep will ly warm and dry; for their Urine will sink into the Compost, and when their Dung begins to foul them, remove it to your Dunghill: Things of so heterogeneous Kinds, Natures, and Qualities, being by this Management mixed, will ferment highly, and the higher the Fermentation rises, and the oftner it be repeated by turning the Dunghill, which will still more mix the Ingredients, the better will the Manure become.

This Method practised, during the whole Time your Sheep are in the House, will raise a great Quantity of excellent Manure yearly, with no great Labour, and the Expence of the Hecks and Lime only. Before the great Dunghill, thus compounded, can be taken out, and applied to the Ground, the whole Ingredients, tho' the Turnings recommended should be neglected, will be thoroughly blended, and dress the Land well; while the Sheep, if they get Plenty without Doors, and be also House-fed, cannot suffer, but through the Keeper's Fault.

When lambing Time comes, as your two Year old Sheep must be in good Order, and able to suffer the worst Weather which can be expected for that Season, put them to the Hills, and bring as many of the weakest of your Ewes to the *Hag* and *Horse-clofe*, as you think it can feed well, and that they may be the better fed, give them Hay: You may put some more of them into your Turnip Fields, if any of the Turnips are unspent: Where and how you are to get them, and how they should rather be spent, you shall be herein after directed. I shall not advise you to sow them,
in

in the Broad-cast Way, as thick as Cabbage Plants, and to let them grow without hoeing, as I see generally practised in this Country.

I walked round and thorough the *Hag* and *Horse-clofe* with your Shepherd, and observed to him, that, as the Grass of it will suffer Frost, and stand thro' Winter, and has Moss and Heath in it, which is in this Country called *Ling*, all which are proper for a Hog or two Year old Sheep Fence; such a Field would be most profitably used for that Purpose, especially as it lay nearer to your House than any other Part of your muirish Ground. His only Objection was, that, as it lay to the North, the Grass of it was often covered with *Rag*, as he named it, meaning hoar Frost: I remarked, that the House feeding with Hay would, of itself, prevent Hurt to the Sheep by it; but, that for further Prevention, they may be kept in the House, till the Sun's Influence discharge the Grass of it: That will do, said he. As to the present *Hog-Park* and the *Far-Park*, I shall hereafter show you, that they may be used much more properly and profitably, than by keeping a breeding Stock of Sheep on them.

With regard to your Mountains, the best Way, I know of, to improve them, is to keep a right Stock of Sheep, to draw the aged, sickly and weak carefully out of them, in the End of Harvest yearly, to keep Horses and other Cattle, but more especially Geese, from among them, and to keep and encourage a careful and diligent Shepherd, who knows his Business, and studies your Interest. If he has these Qualities, he will keep all your Property to the Tops of the Mountains free from Commoners Sheep, and altogether for your own Ewes and young Sheep, and will keep your Wedders and other dry Sheep out of the great Extent of Commons; and thus, when you can com-
mand

mand Turnips and Hay sufficient for Winter-Use, you may, I believe keep betwixt 1500 and 2000 ; for, as I am informed, no Commoner can be hindered to keep as many as he can bring through Winter : If so, the grand Point for you to have in View, is how to get, by your Improvements, immense Quantities of Turnips and Hay, which I shall endeavour to show you how to obtain.

For your Instruction concerning the Diseases of Sheep, and further Instruction with regard to your Choice of a Shepherd, and the Improvement of your Stock, I shall give it to you to drink from a clear Fountain, fresh and sweet, Mr. *Doddsley's Georgic*. His Description of a good Shepherd is :

Skill'd in Wool, and lesson'd deep
In all Diseases of the bleeding Flock.

After this he points him at his Work :

Lo! on the Side of yonder slanting Hill,
Beneath a spreading Oak's broad Foliage, sits
The Shepherd Swain, and patient by his Side
His watchful Dog ; while round the nibbling Flocks
Spread their white Fleeces o'er the verdant Slop,
A Landscape pleasing to the Painter's Eye.
Mark his paternal Care. The tender Race,
Of Heat impatient, as of pinching Cold
Afraid, he shelters from the rising Sun
Beneath the Mountain's western Side ; and when
The Evening Beam shoots Eastward, turning seeks
Th' alternate Umbrage. Now to sweetest Food
Of fallow Fields he leads, and nightly folds,
T' enrich th' exhausted Soil : Defending safe
From murd'rous Thieves, and from the prowling

Fox,
Their helpless Innocence. His skilful Eye
Studious explores the latent Ills which prey
Upon

Upon the bleating Nation. The foul Mange
 Infectious, their impatient Foot, by oft
 Repeated Scratchings, will betray. This calls
 For his immediate Aid, the spreading Taint
 To stop. Tobacco, in the briny Wave
 Infus'd, affords a Wash of sovereign Use
 To heal the dire Disease. The wriggling Tail
 Sure Indication gives, that, bred beneath,
 Devouring Vermin lurk: These, or with Dust
 Or deaden'd Lime besprinkled thick, fall off
 In smother'd Crowds. Diseases numerous assault
 The harmless Race; but chief the Fiend
 Which taints with Rottenness their inward Frame,
 And sweeps them from the Plain in putrid Heaps,
 A Nuisance to the Smell. This, this demands
 His watchful Care. If he perceives the Fleece
 In Patches lost; if the dejected Eye
 Looks pale and languid; if the rosy Gums
 Change to a yellow Foulness; and the Breath
 Panting and short, emits a sickly Stench;
 Warn'd by the fatal Symptoms, he removes
 To rising Grounds and dry, the tainted Flock;
 The best Expedient to restore that Health
 Which the full Pasture, or the low damp Moor
 Engender'd. But if bare and barren Hills,
 Or dry and sandy Plains, too far remov'd,
 Deny their Aid; he speedily prepares
 Rue's bitter Juice, with Brine and Brimstone mixt,
 A powerful Remedy; which from the Horn
 Injected, stops the dangerous Malady.

Further, he says to Sheep-masters.

Cautious and fearful, some in early Spring
 Recruit their Flocks; as then the wintry Storms
 Their tender Frame hath prov'd. But he whose
 Aim
 Ambitious would aspire to mend the Breed,

In

In fruitful Autumn stocks the bleeting Field
 With buxom Ewes, that, to their soft Desires
 Indulgent, he may give the noblest Rams.
 Yet not too early to the genial Sport
 Invite the modest Ewe ; Let *Michael's* Feast
 Commemorate the Deed ; lest the cold Hand
 Of Winter pinch too hard the new-yea'n'd Lamb.

How nice, how delicate appears his Choice,
 When fixing on the Sire to raise his Flock ?
 His Shape, his Marks, how curious he surveys ;
 His Body large and deep, his Buttocks broad,
 Give Indication of internal Strength :
 Be short his Legs, yet active ; small his Head ;
 So shall *Lucina's* Pains less pungent prove,
 And less the Hazard of the teaming Ewe :
 Long be his Tail, and large his Wool-grown Ear ;
 Thick, shining, white, his Fleece ; his hazel Eye
 Large, bold, and chearful ; and his Horns, if Horns
 You chuse, not straight, but curving round and
 round
 On either Side his Head.

I shall only add to the Description of the Ram,
 as momentous to Sheep-masters, Manufacturers,
 and the Publick, that his Wool should be fine.

Now I proceed to speak of the Soils of the arable Inclosures, and to treat of the Husbandry of them.

Longmyre is all a deep clay Soil, except a small Part which has been plowed : That is a kindly light Soil.

The small Field lying South from *Longmyre*, whereof a Part has got one Plowing for a Summer Fallow, is also a kindly light Soil ; there are other two Fields, East from this, of the same Soil : These are in *Lowther Park*.

Briery

Briery-Leys is partly a light Soil, and partly a Clay Soil with a mossy Surface.

Hard-Craig is partly a light Soil, partly a Clay Soil, and there is Moss in it.

Lound-Head is mostly a Clay Soil, but there is Moss in the Field: The Moss has been once plowed. The rest of the Inclosure has got a Sort of Summer Fallowing, and is in part Bear, and in part Oats: What is in Bear was limed for it.

Infield, partly in Bear, partly in Oats, is a good mixed Soil: Where the Bear grows it was dunged last Year.

Meadow-Barrack is mostly Clay with Moss at the Top: The rest of it is Moss, but not very deep.

Rough-Clofs is a pretty good Clay Soil with a little Moss above the Clay: Only, a small Part at the Head of this Clofs is a light Soil.

High-Clofs is a light Soil.

Craig-Clofs Meadows are a Clay Soil with a mossy Surface: Their Divisions into small Parts, adding neither to Beauty or Profit, should be taken out.

Hollow-Green is the same Soil.

New-Clofs is in part Moss, part Clay with a mossy Surface, and in part it is a Loam.

Askel-high Clofs adjoining to the *Fell*, is a light Loam.

Askel-Meadows are a Clay Soil with a mossy Surface.

White-Beck is a Loam.

Kelding is a Loam, inclining in some Places to Clay, in others to Sand.

Dickie-Muir-Darrack and *Peat-Muir*, two Inclosures conjoined, are a Clay Soil with a mossy Surface.

Out-field Inclosure is partly in Oats, partly in Grass on Ground that has been plowed, and partly in Meadow that has never been in Tillage; it is a

Loam inclining to a gravelly Clay: The Meadow has a little Moss above the Clay.

Bleis is a Loam, inclining in some Places to Clay, and in others to Sand.

Bleis-hows is a light dry Soil, and is now in Oats.

Calf-Closs, where the Turnips are sowed, is a clayish Soil.

Hog-Park, *Fir-Park*, and *Dobie's Park*, are all, so far as they are arable, a light, dry, thin, kindly Soil.

All these arable Fields are inclosed, and, except two or three, divided from one another: They are all drainable, having sufficient Descents: They are improveable, and the arable Parts may be enlarged, by taking out thousands of Shrubs which mar the Plowing, and render the Ground under them almost useless.

You will observe, by the Descriptions given, that these your arable Fields are in some Places a light Soil, in others a Loam, in others Clay, and in others Clay with a little Moss above it, and in a few Places a deeper Moss; yet the Moss is nowhere so deep and spongy, but Horses, when plowing, will be able to go through it, after it is fully drained, by which it will become more firm and solid.

Your Trouble by inclosing and dividing is in a great Measure prevented, by what is done; but repair effectually the old Fences, make such Divisions as you see necessary; and, if you please, root out such as I have taken Notice of as unnecessary: As to the draining, do it every where, and sufficiently: You have a good Example shown you at *Armathwait* by Mr. *Spedding*.

If you neglect draining, or fail to do it effectually, you need not expect Success in any other Improvement of a wet Field for any other Thing but Aquatics, as a Stagnation of Water kills, or

at least weakens the Salts in all Manures. By the coarse Grass and Sprets, (in this Country called *Closs*) in your Meadows produced, it appears that the Ground is overcharged with Moisture, which corrupts the natural Nourishment of sweeter and richer Grass.

I now proceed to the Improvement of your Inclosures, the Soil whereof is Moss above, and Clay below; and even of these clayish Soils, the Surface of which is very foggy, and the Deepness thereof can admit of the paring and burning Husbandry; because the Profits that will arise from the Improvement of these, which shall be directed, will afford a Fund for the Improvement of your other arable Soils, which may want the Assistance of Lime, or other Manure to forward it; but the Ashes that will be got by the burning of the Surface of these Soils which are Moss above, and Clay below, and of deep Clay Soils, will, one Part assisting another, be sufficient without the Help of any other Manure, to give, by the Husbandry to be proposed, three valuable Crops of Grain. The Husbandry proper for breaking up of these Fields is, therefore, paring and burning.

Where the Plow, after the burning does not turn up the Clay, sow Bear or Oats; but where it does, sow Wheat as directed, and for the Reasons given Page 249. And,

If the Ground is so inclosed that Cattle be kept out, so drained that there be no Stagnation of Water, or even Spoutiness, and if every other Thing directed, and to be directed, be orderly executed, you may expect a good Crop of Wheat; for tho' your Ground lye high, and the Soil is cold, yet, with Mr. Ray, in his Book of *The Wisdom of God in the Creation*, it is worthy of noting, " That
 " Wheat, which is the best Sort of Grain, of which
 " the purest, most favoury, and most wholesome
 " Bread

“ Bread is made, is patient of both Extremes,
 “ Heat and Cold, growing and bringing its Seed
 “ to Maturity, not only in temperate Countries,
 “ but also, on one Hand, in the cold and Northern,
 “ viz. *Denmark, &c.* and on the other, in the
 “ hottest and most Southerly, as *Egypt, Barbary,*
 “ *Mauritania, The East Indies, &c.* scarce refusing
 “ any Climate.”

If you are afraid to hazard much Wheat on the Account of the Highness of your Ground, and the Coldness of your Soil, sow a Part with Barley, a Part with Oats, and only a Part with Wheat, and so discovering which of them proves the most profitable Crop, keep to that thereafter; but for your greatest Quantity only, because a Season may be favourable for one of the Grains, and for the rest unfavourable; and yet it may not happen so in another Year; wherefore Seasons and Circumstances ought to be well considered, and repeated Trials should be made, before a Matter of this Kind be fully determined.

With regard to the plowing for your Wheat Crop, which I still think promises to be the most valuable, first plow in the Ashes, and then proceed as directed, Page 249. And,

After the Wheat, for further Improvement of these Soils proceed, as directed for Mr. *Spedding*, Page 251. *et seq.* only in place of Potatoes, sow Turnips, and in the Horse-hoeing Way, as directed P. 6. The spending of the Turnips by Sheep, will be the best Way for the Improvement of the Land, and the Method most profitable for you, who have so much Occasion for Winter and Spring Food for them: Mr. *Tull* has directed two Ways;

“ The first is to divide the Ground of Turnips
 “ by Hurdles, giving them Leave to come upon
 “ no more at a Time, than they can eat of a Day,
 “ and so advance the Hurdles into the Ground
 “ daily,

“ daily, until all be spent ; but we must observe,
“ that they never eat them clean this Way, but
“ leave the Bottoms and Outsides of the Turnips
“ they have scooped, in the Ground. The Bot-
“ toms People pull up with Iron Crooks made
“ for that Purpose ; but their Cavities being taint-
“ ed with Urine, Dung, and Dirt from their Feet,
“ though the Sheep eat some of the Pieces, they
“ waste more, and many the Crooks leave be-
“ hind them in the Earth ; and even what they do
“ eat of this tainted Food, cannot nourish them
“ so well, as that which is fresh and cleanly.

“ The second Method is to move the Hurdles
“ every Day, as in the first ; but that the Sheep
“ may not tread upon the Turnips, they pull
“ them up, and then advance the Hurdles as far
“ daily, as the Turnips are pulled up, and no
“ farther. By this Means there is no Waste made
“ as in the other Way: The Food is ate fresh and
“ clean, and the Turnips are pulled up with less
“ Labour than their Pieces can be.”

I go now to your other arable Fields : They
are a Loam or a light Soil, or in a very small Pro-
portion Mofs. Where you have Turnips this Year
in the *Calf-Closs*, you may sow Bear with the red
Clover Seeds after two Plowings, if you can dung
it ; but if you cannot, you should not hazard
Bear, but sow Oats, and the Grass Seeds after
two Plowings also. Where you have Turnips
this Year in *Lowther-Park*, you may, the Ground
being well limed, sow Bear with the Grass Seeds
for the next Crop, and manage the Grass and the
Ground thereafter, as is before directed. Where
you have Bear this Year, there seems to be no
eviting of your sowing Oats for the next Crop ;
for I fear you will think that it is not fit, that
you, whose Hay Fields do at present produce so
badly, should want Oat Straw : But I wish you
would

would sow Pease, which will make the Ground the better of them, whereas the Oats will hurt it: Where you have Oats this Year, plow the Ground presently after the Separation of the Crop from it, water-fur it well, and let it lye so all Winter.

In the Spring harrow it; you cannot harrow it too much: After the Weeds are up, plow and harrow again, and harrow well: Before the tenth of *June* plow again, and harrow sufficiently: The Weeds will, by this Means, be excited to grow: As they grow they will be plowed down, and so the Ground will be freed of so many. By the Plowings and Harrowings it will be reduced to a fine Mould, and by the frequent Exposures be enriched with the Benefits of the Atmosphere and celestial Influences, of which it will have the more or less Suction, in Proportion to the Fineness of the Particles it is reduced to. In *June* sow Turnips on the Ground so prepared, in the Horse-hoeing Way, as directed for Mr. *Spedding*, Page 261. *et seq.*

These Parts of your arable Ground lying in Grass, (except the Peat Earth or Moss, which shall be herein after treated of) must be plowed for Oats without Dung, if you cannot get it; for I fear you would not have Patience while you are losing a Crop, to give it such a Number of Plowings, (for it would require a great many) as would reduce it to a fine Mould, without which Summer Fallows are always of little Value, and if the Land be light, they make it worse; but the Turf being turned down by the plowing for the Oats, it will be rotting until the next Plowing, and then it will be the more easily made fine.

After the Oats are off the Ground, plow, harrow, and do every Thing, as before directed for a Crop of Turnips, sow them, and after the Turnips,

nips, labour for, and sow Barley with Grass Seeds, as before directed. Now, having gone distinctly and carefully through all the Soils of your arable Ground of *Widop*, except Moss of such a Deepness as cannot allow the Plough to touch the Clay, if this Moss is not sufficiently drained, it is in vain to make any Attempt; but if it is made dry, and is become so firm, that it can carry the labouring Cattle, pare and burn it.

This Soil, at least in the Beginning of the Improvement of it, is not so fit for Wheat as for Barley, Bear, or Oats; and the Quality of your Moss, and the Quantity and Quality of your Ashes must determine, whether you should take Oats, or may venture to sow Bear for the first Crop: If you should sow Rap-feed, I fear the Birds would destroy it in this woody Country.

Sow Turnips for your second Crop, after at least two Plowings, and as many Harrowings; but be sure, for Prevention of the subsiding of the Ashes, to manage your Plowings as before directed; which if you do, you have Reason to expect a good Crop; for by an Experiment mentioned in the *Transactions of the Royal Society*, N. 360. Page 974. it has been found, that in Moss or Peat Ground, Turnips have by Growth increased 15,990 $\frac{1}{2}$ Times the Weight of their Seeds each Day they stood upon it. Sow Bear or Oats, as you please, for the next Crop, and therewith Rye-grass, and a Mixture of the Clovers, and so let this Moss Ground lye for Meadow. When it fails dung it, or repeat the Husbandry aforesaid.

There is a large Extent of Ground in the *Hog and Fir-Parks*, that, as it has been long pastured, would produce Oats without Manure; but, since these Parks would feed the fewer Cattle, and be the less convenient for grassing, if Parts of them were plowed; and seeing you may make large Returns
from

from them, by taking out the Briers, Thorns, and useleſs Buſhes, and then keeping old Ewes, old Cows, and Wedders therein, in a mixed Stock, I adviſe you to uſe them in this Way ; for by ſo doing, you will make far more Profit than by wintering Hogs in them, as you now do, ſince they muſt, by going there, be infected with the Diſeaſes, which Graſs growing from rotten Ferns, Leaves of Trees, &c. muſt breed in Hogs.

Where can you ſo well keep, through Winter, the aged and weak Ewes you ſhould draw out of your Stock yearly ? and what Sort of Cattle will give ſo much Profit by graſſing as they, with their Lambs, will in the following Summer and Autumn ? If you put in ſome of your beſt Wedders, they will be fat in the Spring, when Mutton gives the higheſt Price : Theſe Wedders being then ſold, and as many old Cows and Wedders as you have good Graſs for being put in, you may get largely by this Graſs : The Graſſier gets more Money by no Cattle than by theſe, if they are well kept on proper Ground, which this is. To enlarge your Number in Winter, you may allow them the Fog of your Incloſures, lying North-weſt of your Houſe, and contiguous to theſe Fields.

Wood being your Lord's Property, you ſhould prevent the Growth of it, in thoſe Parts of *Dobie's Cloſs* which have been plowed, by rooting out the Plants which are riſing : Then, the Ground being ſo ſteep as not eaſily to admit of plowing, mark out theſe ſmall Fields for Potatoes in the lazy Bed Way ; and on the Beds ſo marked out, ſpread Ferns, when they have moſt Juice in them : Lay them thick ; for you have more growing around than you can uſe. Next, from the Parts marked out for the Trenches, throw Earth upon the Beds, as if you was covering Potatoes, and make the Earth pretty thick above the Ferns : Let the Ground

lye so until the usual Time of planting Potatoes : Then plant them as Garden Beans, or point them in with a Spade ; and as soon as they are above Ground, cover them again gently from the Trenches. Thus you will have as good Potatoes, as if the Ground was dunged any other Way.

When raising the Potatoes, fill up the Trenches, and after two Plowings at least, and taking out the Roots always as you are working, sow Bear or Oats with Clover and Rye-grass Seeds : The Wood being your's for the Use of the Ground, you cannot want Materials for fencing in of this Potatoe Ground ; and this *Dobie's Closs*, in which it is, will be profitably employed, if used as directed for the *Far and Hog Parks*.

If you manage as directed, and go on with Spirit, you will soon have Clover enough : In Summer and Harvest, give some of it at Night to your Horses and Cows in the House, and bed them with Ferns. As you have plenty of Clay, Moss, Ferns, and will thus get Dung, be constantly, during these Seasons, making Dunghills of these Materials, with the Addition of Lime ; make and enrich them as directed Page 26. *et seq.* and use them as I have advised Mr. *Spedding*, Page 263.

Would you, after I have told you how to manage so, as you will have Need for little Manure, have more of it ? Would you have it better ? or would you have it cheaper, than by following the Directions I have offered ? Possibly you would ; for seeing the bad Effects of taking robbing Crops with next to no Dung, I have heard you cry out, I cannot get Manure. What can I do without it ? Now, you shall have no Cause for that Complaint ; for if my Advice is followed, there shall never be Want of it more at *Widop*.

Such is the Situation of your Ground, that you can easily bring the Water that comes from the

Mountains, down upon all the Parts of your arable Fields. Here you will possibly exclaim, and cry, Hold, where is the Man going? My Ground is confounded and ruined with Water: Can he think that I will be led by him, to destroy my Ground so damaged by Water already? Have my Friends and I called him into *England*, to tempt us to ruin our Properties? At Leisure; have Patience, Sir; hear me before you condemn me.

Was I advising you to bring Water upon spouty Ground, Ground troubled with Water inherent in itself, or Water coming externally and stagnating upon it, and Water that you had no Command of, I own your Charge would be just, and I deserved to be hissed out of your Country: But read what I have said and insisted on concerning draining; not Child-like draining, draining by little crooked and open Rills, but Man-like, reasonable and effectual draining, the Drains being straight and covered, except the main Drain, or Drains, where there is much Water to be discharged. Have not I told you to follow the Example your Neighbour Mr. *Spedding* has shown you at *Armathwait*? Have not I spoke of the bad Effects of Spoutiness, or a Stagnation of Water? and said, that, if your draining is not effectually executed, especially since so much Rain falls where your Estate is, your after Designs of Improvement will be unsuccessful? But your draining being effectual, and you having full Command of the Water, I do say, that you have in your Power to make a most excellent Improvement, by working the very Water properly, which has hitherto been so noxious.

The Way to obtain this Improvement by Water, is first, as I have said, to get a full Command of it, and then to carry it alternately on and off your Ground, first made dry; which Water so wrought, will, by the Settlement of the Mud falling down there-

therefrom, and its other Effects, be a yearly Supply to the Land, and make and keep it so rich, without any Aid whatsoever, that you may mow it annually, and get valuable after Growths for Pasture for ever, while your Ground is continued in Grass, if the Water is only carefully wrought, and with Judgment ; and if the Land is plowed, it will give great Crops of Corn, as Experience has fully proved.

The *Dublin Society*, who do eminent Services to their Country, and are an Honour to it, have given an Account of the Method and Advantages of flooding Ground, in these Words ;

“ When the Farmer can thus command the
“ Flood, and make it subservient to his Profit,
“ he has a constant Manure at Hand, which will
“ soon reward his Labour and Expence. How-
“ ever, he must manage it with Caution. The
“ *Winter* is the only Season for flooding low Lands,
“ and the Beginning of a Flood the best Time ;
“ it is then foul and muddy ; and as it fines, de-
“ posites a rich Slime, which improves the Ground
“ beyond any Manure whatever. When that is
“ done, the Water will soon clear, and then is the
“ Time to discharge it. If a Flood lies long up-
“ on Ground, it will chill and spoil the Grass ; but
“ if it lies two or three Days only, it will enrich
“ the Soil without doing any Damage*.”

I beg these honourable Gentlemen's Leave to think, that dry Ground pastured with Cattle (and all Ground ought to be made dry before flooding) is most profitably watered in Summer ; for then it will make the Grass grow vigorously, when it might otherways fail in a Drought ; and that such Ground is the more enriched, if it is watered both in Summer and Winter.

If it is objected, that even the Slime will spoil the Grass, especially if it is deep, and Sand much more. I answer, that Cattle feed best when the Grass is neither long nor short, and that then it turns to the best Account: When it is long, if tender, they destroy much of it with their Feet; if long, strong, and come to Seed, it is not only worse in Quality, but the Ground is robbed and deteriorated by it; for while Plants are feeding, they are great Robbers, and the riper the Seed becomes, they are the more voracious, and throw out their Juices the more profusely, and so exhaust and rob the Ground the more violently. Next,

Where is the Danger of watering pastured Ground in Summer, the Husbandry being right conducted? But that it cannot be, unless the Command of the Water be first obtained, and it be only allowed to glide so gently over the Surface of the Earth, that it cannot carry Sand along with it in any great Quantity. The Slime that it leaves will be of so excessive fine Parts, that the Dews, which fall most and heaviest in hot and dry Weather, will soon wash it under the Bite of Cattle. Though they should not, I say still, where could the Hazard be? for these fine Particles of Earth, when eaten by the Cattle with the Grass, are no doubt nutritive: With Water they constantly get them; for all Water is more or less charged with Earth, and Water only, by the Earth in it, has been found to support even Men to a prodigious Length of Time. If such Particles were poisonous, not only Cattle, but Mankind would be destroyed; for we receive them every Minute with the Air: Yea, Grass itself is nothing, at least little else in Substance, but Earth, Water, and the Effluvia of the Air, altered in the Vessels of the Plant.

Besides what is observed, it might be supported, that the fine Particles of Earth, of which the Slime

is composed, is the more enriching, the more and the longer they ly exposed to the Action of the Sun, which hath its strongest Influence in Summer, and to the Exertion of their own Power of Attraction and Suction of the heavenly Influences: But, why do I trouble myself? for even supposing the Slime be hurtful or disagreeable to Cattle, is it not easy to keep them out of a newly watered Field, and in another, until Rain comes, and washes it down to the Roots of the Grass? So it is my Opinion, that Water, under Command, and well governed and managed, is, as aforesaid, most profitably applied to dry Pasture Ground in Summer, and that in the hottest and dryest Weather the greatest Benefit is to be got by it, for the Reasons I have offered: If Water can be got in Summer, as in your Case it can, and if then it has the best Effects, What a Loss would it be, if by Reason of a mistaken Notion, it should not be used in any other Season but Winter only, since we know that it improves Ground beyond any Manure whatsoever?

Mr. *Blith* in his *English Improver improved*, published more than a Hundred Years since, treating of the Improvement by Water, says:

“ Thou hast also a great Advantage hereby; having Water drawn over thy Land, thou art in such a Capacity that, in Case of Drought in Time of Summer, thou needest not fear it: Thou mayest now and then wet over thy Land in the Heat thereof, when Grass, if it have but Moisture, will grow faster in so hot a Time than any; but be sure not to soak thy Ground too much, keep thy Land rather in a thirsting Condition, not glutted, ready to spew it up again, so mayest thou preserve thy Land green and fruitful, when others are scorched all away: Then may a Week's Grass, or a Load of Hay, possibly be worth three or four.

“ I myself, by these Opportunities, have cut
 “ twenty four Load in a Meadow, where I cut
 “ but five or six the Year before, when Hay sold
 “ at a great Value ; the Directions exactly follow-
 “ ed, I will lose my Credit, if thou failest of the
 “ Effect proposed.

“ And for thy Encouragement, I will give thee
 “ a Precedent or two: Certain Acres of light
 “ Land were taken for a Term of twenty one
 “ Years, at the Value of 1 s. 6 d. *per* Acre, and
 “ that was more than it was worth: A little Brook
 “ with a Land Flood, issuing out of a common
 “ Field, was brought over it, the Land levelled,
 “ and made fit and even to receive it, for it was
 “ very irregular, and of great high Ridges before,
 “ after the Manner of that Country, and after
 “ two Years working, 30 s. an Acre would have
 “ been given for it, being wrought just by the a-
 “ foresaid Directions: I myself offered it, but was
 “ refused. I have made the like Improvement
 “ myself on Land of the same Nature, to as
 “ great Advancement as is here spoken of.”

You have heard what was said of Improvement
 by Water in the Days of Yore. You shall now hear
 from Mr. *Dodsley's Agriculture*, the modern Opini-
 on concerning watering in Summer, with the very
 same Kind of Water which you have: He tells
 you in his Preface, that he did not trust entirely
 to his own Judgment, but had consulted Men as
 well as Books for the Knowledge of his Subjects;
 and that his Work was not a hasty Performance,
 obtruded on the Publick without the Approbation
 of several Persons, whose Judgments he could have
 no Reason to doubt. He says :

Him, who o'er his sandy Fields,
 Too dry to bear the Sun's meridian Beam,

Calls

Calls from the neighbouring Hills obsequious
 Springs,
 Which led in winding Currents thro' the Mead,
 Cool the hot Soil, refresh the thirsty Plain,
 While wither'd Plants reviving smile around.

In support of my Opinion, that Ground is as much, or more improveable by Water in Summer as in Winter, I shall offer you another Authority, which shows the high Value that Foreigners put upon the Command of it for enriching their Ground.

In *Nature Displayed*, Dialogue of Meadows, we are told, “ That if there is any Danger, occasion-
 “ ed by a severe Drought, lest the Grass should
 “ wither before it be ripe, or be stunted in it's
 “ Growth, in this Case the Husbandman is wont,
 “ in those Places where there is a Possibility of do-
 “ ing it, to water his Meadows; which he effects
 “ by letting the Water in upon them by Sluices
 “ from the adjoining River, or by turning some
 “ little Rivulet out of its natural Course, and
 “ forcing it into an artificial Canal, made on Pur-
 “ pose to receive it, the Banks of which are raised
 “ higher than the Level on each Side, that the
 “ Water being damm'd up at the End of the Ca-
 “ nal may swell above its Brim, and then diffuse
 “ itself over the Meadows, pouring forth Moisture
 “ and Refreshment upon the thirsty Grass. In
 “ some Parts of the Country every one succeeds
 “ in his Turn to the Right of the Water, who
 “ after having employed it in this Manner for
 “ his own Use, during the Space of half an Hour,
 “ or perhaps an Hour, he is obliged to shut up
 “ his Sluice or Drain, that it may pass on to serve
 “ in like Manner for the Benefit of his Neigh-
 “ bour. In the Provinces of *Valencia* and *Anda-*
 “ *lusia*, they keep their Meadows from being parch-
 “ ed

“ ed up by the excessive Heats they are subject
 “ to in those Places, by Means of Trenches, by
 “ which every Man draws a Communication be-
 “ twixt his own Land and the adjacent River; and
 “ when the Water happens to be lower than the
 “ Surface of their Meadows, they disperse it up-
 “ on them with Scoops and hollow Shovels out of
 “ the Trenches, infomuch that the River *Xucar*,
 “ after being laded out in this Manner for the
 “ Space of twelve or fifteen Leagues, becomes
 “ drained almost dry.”

Now, Sir, I have advised you how to manage your Pasture Grounds, and how to improve your arable, both in a Way which I can support. I have shown you how to have need for little Manure, and how to get an immense Quantity of it, which will be very good, on a trifling Expence; and that you may have the less Use for it, I have likewise shown you how to work an excellent Improvement by your Water, which has hitherto been destructive to your Ground. So I conclude, wishing you Success.

Memorial for the Honourable Sir James Lowther, Bart. by Mr. Maxwell.

EMPLOYED by Mr. *John Spedding*, your Steward, I have viewed and considered your Estate at *Abbey Holm*: The Soils of that Part of it in the *High Holm* are on the Water Sides a Loam, and in the higher Grounds a Clay. The *Low Holm* is, in general, a Carse; that is, a Clay to Appearance: And yet, I think, it cannot be properly called an original Clay; for it may be presumed, that the Sea hath, in some former Age, overflowed this *Low Holm*, and that, by the Subside from the Sea Water,

ter, this particular Kind of Soil is made up of exceeding fine Particles, which must be impregnated with Salt, and well husbanded produces weighty Crops.

There is no Difficulty to believe, that the Sea hath once had Possession where the *Low Holm* now is; for the Limits of the Sea are not fixed: We observe that it takes from one Coast, and leaves to another. A Gentleman who has an Estate on the *Scots* Side, betwixt *Scruffel* and the Sea, gains and loses Land in this Way alternately: He often possesses it for a long Time, and it produces a very fattening Grass for Cattle of all Kinds: For Sheep it is medicinal, curing them of the Rot; but then the Sea repossesses itself of the whole or a Part by Turns, and probably leaves Land elsewhere in proportion. In my Memorial for his Grace the Duke of *Queensberry* concerning the Improvement of *Lochermoss*, herewith published, it is shown that *Solway Frith*, which probably hath overflowed your *Low Holm*, has flowed (where that Moss now is) ten Miles into the Country.

Loam, Carse, and Clay, are reputed the best Soils: Whether Moss, [Peat-Earth] would, if improved, be as good as any of them, will be best known when a full Improvement of that imprudently neglected Soil is made. Your Estate at *Abbey Holm* (except *Wed Holm*, which shall be herein after spoke of) being all either Carse, Clay, or Loam, of the best Kinds, may, I believe, be improved, to produce as good Crops as any Ground in *Britain*, where the Weather is not better, or the Sun's Influence greater.

If I should be told, that the Ground does not produce such Crops, tho' it is improved already, being inclosed, divided, and having been plowed, and cropped; for such is called improved Ground in this Country: I should observe and answer, that

inclosing and dividing is indeed in part an improvement; for the Land is thereby made warmer, the Expence of herding is saved, and Way is made for a greater and more valuable Improvement, the enriching of the inclosed Fields; but it is not every Sort of plowing and cropping that makes Ground better: No; by plowing and cropping, Farmers can, and very often do, destroy Land. To prevent which, I see no Way more probable, than the letting of it only to such as will covenant, to work and crop it conform to a certain Plan of Operations, to be expressed in their Leases; which Plan may be such, as must improve the Ground, and prove highly advantageous to themselves, if well executed.

When an Estate lies in different Places, has different Conveniencies, is of different Soils, and probably must be let to Farmers of different Ways of thinking, who may have very different Designs in View, it is difficult to form any one Scheme, that they will all go into, tho' good for them all; yet, I think, some Help may be offered to the forming of such a Plan for the Improvement of Ground, as any Farmer, who is rational, may be brought into, by showing him how much the Execution of it must be for his own Advantage.

To this Purpose I observe, that there is no Way occurring to me, to enrich Ground while in Grass, but by the Dung and Urine of the Cattle that eat it, or by Water, which can be seldom obtained, or else by Manure of one Kind or other, which often cannot be got for Money; unless the Grass be allowed to rot, which I do not recommend, or it be allowed to grow high, which too few will practise, that it may feed the more from the Atmosphere, and so maintain the more Cattle, whose Dung and Urine will the more enrich it: Whereas, by plowing for a sufficient Number of Times, by
sufficient

sufficient Exposures, and by enriching Crops, it can be made rich and fruitful.

If this is the Case, methinks it is necessary for the Landord to bind the Farmer, to proceed in a Way profitable for the Farmer himself; namely, to sow always, with his last Crop of Grain, St. Foin, Clover, or other Grass-seeds, the Seeds of natural Grass excepted, because they are often, I fear always, greatly mixed with the Seeds of Weeds, whereof the Ground will be possessed of many, tho' all that is possible be done, to prevent the putting any into it, and to kill those that are in it. —He should also be bound, for his own Good likewise, to cut the first Crop of this Grass, for the Reasons assigned Page 227.

All understanding Husbandmen will readily allow that one Acre, made fine, clean, and brought into a Condition to give good Clover, will, if sowed with the Seeds of it, give three or four Times as much Grass as it would do, if allowed to go to natural Grass, and so the Manure made by it must be proportional; for it will feed a greater Number of Cattle in proportion: Besides, Clover allowed to grow to its Strength, is an Enricher, tho' fold and carried off the Ground, as is shown Page 234.

Here is a great and visible Advantage to the Farmer, and so he should be bound to sow it, or some other Grass-seeds, as aforesaid, the Ground being fit, or made fit, to give a good Crop: But it is not possible to bring Ground into good Order without curing it of Spoutiness, and freeing it of any Stagnation of Water, which sours it, and, at least, weakens the Salts in all Manures; wherefore the Farmer ought to be bound to drain his Ground, and to keep his open Drains and Ditches clean, and the Mouths of his covered Drains open: These Things are likewise evidently for his own Profit; for,

for, besides other Advantages, the yearly Cleanings of his Ditches will afford him one good Ingredient for his compounded Dunghills.

Wheat, Rye, Oats, Flax, Barley, and others of that Kind, rob and impoverish Ground; Pease, Beans, Potatoes, Turnips, Clover, and others of that Sort are by their Natures, and the Husbandry necessary for them, both Cleaners and Enrichers of it, tho' the Horse-hoeing Husbandry, which the lower Class of Farmers are unwilling to practise, be not gone into: Now, if Wheat, Rye, Oats, Flax, and Barley, are Robbers and Impoverishers, and Pease, Beans, Potatoes, Turnips, and Clover, are Cleaners and Enrichers; then, to hinder Farmers from destroying Ground by robbing Crops, and to effectuate the Improvement of it, by a Method of cropping, which must be greatly profitable to themselves, they should in all Cases (except where Manure can be got at a very small Expence) be expressly bound by their Leases, to interject always an enriching betwixt every two robbing Crops, and to consume the Fodder upon the Ground, or to buy Dung to a greater Value than the Fodder could make.

If Farmers were bound to Summer-fallow, in every such Number of Years as can be agreed on, the Land would be improved, and they would be greatly profited; but then they must be bound to plow it many Times during the Fallow, and not left at Liberty to plow it, perhaps, only once or twice, by which they make it worse than it was, as that Plowing raises Weeds, which, dropping their Seeds, make it fouler, and as light Land is, by insufficient Plowing, made lighter, getting thereby more and larger Cavities: Then, when these or either of these happen, they betray their Ignorance, and cry out, *The Land is hurt by Fallowing,*

ing, tho' their Slothfulness, their mock Fallowing, is the only Occasion of it.

I am sorry that I am forced to think, it is only by such Covenants, that the lower Class of Farmers will, at least soon, be brought to work by reasonable Rules; but, I know, Mr. *Spedding's* Capacity will enable him from these Hints, to form proper Plans of Operation, and that *his known Zeal for your Interest* will excite him to use his utmost Endeavours, to get your Farmers bound, in the Leases to be granted hereafter, to such Covenants as before mentioned, with Improvements on what I have said.

I fear the Farmer's Curse, unless I pray fervently: As I don't pretend to be very well gifted, I shall, by and by, supplicate in the Words of one who is; the ingenious Mr. *Dodsley* in his Agriculture. For Farmers will, probably, cry out, What? the Man is for laying an *Egyptian* Burden upon us, Burdens greater than we are able to bear!

To depress the Spirit of Farmers, especially of such of them as are willing to become bound to improve, would be highly unreasonable; yea, it would be injurious to the Community; for skilful and industrious Farmers are the most necessary and useful Members of it. I therefore beg you to let them have long Leases, moderate Rents, and to such of them as may not be sufficiently able, lend Money, that they may have Ability, and go on with Spirit, if you are satisfied that they are honest and industrious. Now, pray hear me in the Words of Mr. *Dodsley*:

O ye, whom Fortune in her silken Robe
Enwraps benign; whom Plenty's bounteous Hand
Hath favour'd with Distinction: O look down,
With Smiles indulgent, on his new Designs;

Assist

Assist his useful Works, facilitate
 His honest Aims, nor in Exaction's Gripe
 Enthral th' endeavouring Swain. Think not his
 Toils

Were meant alone to foster you in Ease
 And pamper'd Indolence: nor grudge the Meed,
 Which Heaven in Mercy gives to cheer the Hand,
 The labouring Hand of useful Industry.
 Be yours the Joy to propagate Content;
 With bounteous Heaven co-operate and reward
 The poor man's Toil, whence all your Riches
 spring.

As in a Garden the enlivening Air
 Is fill'd with Odours, drawn from those fair Flowers
 Which by its Influence rise: So in his Breast
 Benevolent, who gives the Swains to thrive,
 Reflected live the Joys his Virtues lent.

This Petition I would have omitted, if I did not think the Power of it may have Influence on others; as I intend to publish this, with other Memorials I have wrote for Gentlemen of Distinction. If your Character is just, no Man was ever enthralled by you in Exaction's Gripe; but the Joys your Virtues have lent, must live reflected in your benevolent Breast.

Wedholm is almost totally a deep spongy Moss or Peat Earth; the same, without any material Difference, as *Lockermoss* forementioned: And, having in my Essay on the Nature, Qualities, and different Methods of improving Moss, and in my Memorial concerning *Locher Moss*, spoken of this Soil, and both these Papers, with my later Observations concerning it, being herewith published, I refer to them.

If I should speak of the Management of your Grounds near *Whitehaven* unleased, all I could say,
 would

would necessarily end in the Commendation of Mr. *Spedding*; a Gentleman who deserves to be esteemed, by the Town and Country in which he lives, for the many and great Services he has chearfully done them in obedience to your Commands.

Your Uplands about *St. Bees*, and betwixt it and *Whitehaven*, want draining in many Parts, which Mr. *Spedding*, by what he has done in that Way, shows he knows well how to direct. They are greatly troubled with Whins; to get free of which, follow the Directions given Page 107.

Your Low-lands betwixt *Whitehaven* and *St. Bees* are drained, or a-draining with Judgment; and where they are Peat Ground, as the greatest Part of them is, the Husbandry of them thereafter is directed in my aforesaid Essay on Moss.

High Wrae, *Low Wrae*, and *Wedacre-Hall*, may be improven by covenanting with the Tenants, as before proposed. During the Currency of their Leases, they may perhaps be so foolish, and injurious to their own Interest, as not easily to comply to it: If they are backward, I humbly think it is for your Interest, and the Good of the Country, to encourage them some Way or other into a Compliance; which if they inflexibly refuse, it will certainly be just and commendable to make them feel your Displeasure.

Moor-side Park, and *Moor-side* low Ground, are separately inclosed, but nowhere divided within themselves. They have not a House on either of them, but are exceedingly improveable. The Way to improve them is, to build Houses on them, to divide them, and to drain the Ground, and then the paring and burning Husbandry is proper for the greatest Part, which is now covered with Heath, here called Ling; thereafter the laying down the Ground, Field after Field, when it is in Heart, and is mellowed, with Grass from Grass Seeds sown, will

will work a very great Improvement on the heathy Part: The rest ought to be broke up by a well ordered Summer-fallow, and before the Ground is exhausted with Corns, should be laid down with Grass Seeds as aforesaid.

LETTER to GABRIEL GRIFFITH of Widdop, Esq; Merchant in Whitehaven, by Mr. Maxwell.

S I R,

IN Compliance with your Desire, I shall give you my Opinion concerning the Improvement of your Company Farm near *Egermont*; for I have considered the Nature of the Soil: The Staple, or upper Stratum of it, lying on a strong Gravel, is warm and kindly, tho' light and shallow. You see Whins, Broom, Briers, Bramble, Ferns, &c. natural to that Soil, strive to overcome it; it is therefore necessary that the Plow be employed, to prevent the thriving of that Trumpery, which exhausts the Strength and Spirit of your Land, and renders your Grass and succeeding Crops of Corn of small Value.

When I consider that you told me you would be satisfied, if the whole Farm, containing about seventy Acres arable, could be brought into a Condition of maintaining about thirteen or fourteen Horses, so many being necessary for your Iron Work, and the labouring of the Ground; I cannot say, you are immoderate. I shall therefore try, if I can put you upon a Method, whereby your Desire shall be more than satisfied. Surely you will not complain, tho' you also, by your Crops, be enabled to pay the Rent, the Farm-Servants, and a Bottle when we meet: I shall endeavour to deserve it.

I can-

I cannot easily, your Soil being considered, point out a less laborious, simpler, and better Way, and a Way to get more Profit so soon and so cheap, than to exclude natural Grass, and to sow one fourth of the seventy Acres with Oats, another Fourth thereof with Pease sown under Fur, that is, on the Stubble, and to plow them down with a light Fur; another Fourth, being your richest Ground, with Bear, or, to make surer Work, with Oats and the great Clover Seeds, without any other Clover or Rye-grass Seeds; and to Summer-fallow the remaining Fourth, giving it at least three Plowings in Summer and Beginning of Harvest, and another in the Spring, with Harrowings between them: These for your first Year's Labour and Crop.

For your second, lay all the Dung you may have, or can get at a moderate Expence, on your fallowed Ground: Sow such a Part of it with Bear, as you may judge to be in Condition for that Grain, and the rest of it with Oats, and sow great Clover Seeds on the whole of this Fourth; from the Fourth that was sown with Clover Seeds, cut Clover for feeding your Horses, and Cows, if you have any, in the House, giving your Cows, lest they swell and die, very sparingly of it at the first, and make Hay of the Remainder, of both the first and second Crops; I mean the first and second Crops in one and the same Year. Fear not the Charge of cutting and carrying; you will find, if you make a just Observation, that you will thus have as much more useful Grass as will more than pay three Times the Expence thereof, though the Distance was greater than it is: On the fourth that was sown with Oats without Clover Seeds, sow Pease in Manner before directed; and on the remaining Fourth, where the Pease grew, sow Bear, or Oats, with Clover Seeds, as, by the Pease, you

Q q

will

will be able to judge, whether the Ground is in Condition to bring the one or the other Crop.

For your third Year's Crop, sow Bear or Oats, with Clover Seeds where the Pease grew ; Pease, sown as aforesaid, where the Oats sowed without Clover were, Oats where the Clover grew, and use the Clover on the remaining Fourth, as before directed, and so go on yearly, sowing Oats after Clover, Pease after Oats, and Bear or Oats with Clover Seeds after Pease ; the Clover to be still used as aforesaid ; that is, by cutting it twice in one Year for Hay, and spending Green in the House : Lay, and spread on your Clover Ground, all your Dung, immediately after cutting the first Crop, giving always more Plowings than one to the Ground where the Grain and Clover Seeds are to be sown : But your Horse Dung being hot, will prove the more proper Manure for your warm Soil, if it is compounded, as I in my Memorial advised you, with Clay or other strong Earth. The Manure will force the second Crop to be very strong ; the Growth whereof will prevent the Exhalation of the Juices of your Manure, and the Clover and it will jointly enrich the Earth, rotting the Surface of it, and impregnating it ; or you may lay your Manure on the young Clover, after cutting the Corn, which will nourish both the first and the second Crops of your Clover, and also answer the other Ends aforesaid ; or else you may use Part of it in the one, and Part of it in the other Way.

Which Way can your Dung be used more profitably ? Which Way can you draw greater Profit from your Ground, with no greater Trouble or Expence ? Will not two good Horses, and one good Servant, plow, sow, and harrow fifty-two Acres and a Half of your light dry Ground ? and may you not reasonably expect that, according to this Management, the Crop of every Acre of your seventy

venty will, one with another, be worth fifty Shillings, or three Pounds, or more? Will you then have Reason to fear the Want of Provisions for your Horses? Will you be troubled with Whins or Broom, &c.? And which, in my Opinion, makes this Plan far the more valuable, will your Land ever grow poorer? or rather, must it not grow richer, even with the Assistance only of the Dung you must make with your Horses, if this Plan is invariably pursued? For, if the one Crop impoverish it, will not the immediately succeeding as much enrich it? will not your Dung cast the Balance on the desired Side? and will not the Consequences of such Balances repeated, and again repeated, have an excellent Effect? That is, must not your Ground soon grow rich, and still grow richer, while the Plan is without Variation followed forth? But, though your Ground should grow poorer, may you not, out of your Profits, purchase some Dung? or, if you cannot get it cheap at a convenient Distance, cannot you plow in a second Crop of Clover, as often as you observe that the Balance is not as you would have it? But that cannot happen, as the Trumpery fore-mentioned and the Weeds, these Robbers, who generally starve and ruin Crops, must be destroyed, at least incapacitated to compete with yours. I have been very observant, and can see little Ground in all my Travels that I can suspect to want Strength to produce a good Crop, if it were fully drained, made fine by Plowings, and freed from Weeds: I am quite satisfied that Weeds themselves take more Strength from *British* Ground, besides the other Mischiefs they do, than all the Dung in *Britain* gives it.

I thought to have thus left the Subject; but, considering the Respect I have for your Company, and the Duty I owe to you, I shall not yet drop it, but look back, and re-consider what I have said:

said : For I guess, were I with you when you read what I have wrote, I should hear you raising Objections ; as I know you are cautious and careful, and that you want to be fully satisfied of the Reasons for, and Practicableness of every Thing you are concerned in.

You will probably say, he advises to plow up all the Ground the very first Year ; but what shall be done for Grass for the Horses thro' Summer, and until after Harvest ? The Answer is, Take a Grass Field from Mr. *How*, or where you most conveniently can ; for if the Plan is profitable, the sooner you get into it, the greater will your Advantage be : Good Things are seldom best done by Halves. He also advises to sow the great Clover Seeds only, without any other Clover or Rye-grass Seeds : But would not the Hay be finer, if they were sown also ? and tho' they were, will not the Hay of the second Crop make foul Feeding ?

I acknowledge the first Crop would be the finer ; but it is Quantity, and Strength of Food, that you want for your labouring Horses : The great Clover makes by much the weightiest Crops ; the Hay of it is strong Food ; the Foulness of it cannot affect them ; their Work will prevent any bad Effects it could have ; but you shall be shown how to make it fine enough.

The Matter to be most considered by you is, What are their different Effects to the Ground ? Rye-grass is an Impoverisher and Foulter ; the great Clover is a Cleaner and Enricher of it ; and the small Clovers come not to their Strength, till they have been Years on it ; and by the Plan, you see the Clover Ground is to be plowed, after being cropped with it for one Year only, the Reasons whereof are many and powerful : Some of them are ;

If

If the Ground was continued longer in Grass, and especially if it was pastured, the Whins, Broom, &c. would prevent the Growth of much of it, and exhaust the Substance of the Land: The mowing would indeed hinder them to grow high, but would, I fear, occasion them to grow the broader, and to overspread the Ground the more. The great Clover is the greater Cleaner and Enricher, if it is allowed to stand no longer than one Year; for if continued, the Particles of the Earth coalescing, the Weeds and natural Grass prevail; it starves, and then dies away, by which the Land becomes barren and foul: Whereas, when the Method proposed is pursued, the Ground is enriched, it having little Time to until itself, the natural Grass to take Place, or the Weeds to strengthen their Roots; and few of their Seeds ripen, when it is cut as aforesaid, Clover being an early Plant. Besides, the Roots of it are fullest of Juice the first Year of cutting, and when a Stop is then put to its Growth by plowing the Ground, the Water entering the Cut, the Roots rot quickly, and raise a sudden and strong Fermentation, which opens, divides, and enriches the Soil, more than these Roots can do when grown hard, dry, and juiceless, being allowed to grow for three Years Crops or upwards, as in the common Method.

You will probably still object and say, What? will I plow my Ground, when I can get rich Crops for two Years more, without either plowing or sowing? No; this would be an unnecessary Labour and Expence. Not unnecessary, say I, because the Method proposed appears evidently to be profitable, highly profitable. What is the Expence of Seed? Three or four Shillings *per* Acre. Why destroy or confound a rational Plan for nothing, or next to nothing? Surely you will not be wilfully blind to your own Interest, and led by Custom against Reason:

Reason: But, why said I Custom? for such is only the Custom of the Ignorant, or inflexibly obstinate. The Practice of all the good Clover Husbandmen in *Britain* is suitable to the Method I have proposed for you; only, some of them cut the second Crop for Hay, others of them use it for Pasture; do you either of those Ways you will: But, methinks, I could give Reasons incontestable, showing the first to be the most profitable, if my Letter was not swelling immoderately; or rather, if I did not think they would occur, after what you have heard.

I foresee another Objection you will probably make: Why am I confined to Oats, Bear, and Pease? Is not the Land by its Nature fit for Rye and Turnips? Did he not see very good Turnips belonging to Mr. *How*, growing on a Field almost adjoining, and of the same Quality with my Ground? I grant the Alledgeance; but I suit the Husbandry I direct, as near as I justly can, to the Wants or Demands of my Friends or Employers made known to me. You may very properly sow Rye after Clover in place of Oats, and Turnips after Rye, or Oats instead of Pease: But, will Turnips feed your Horses as well as Pease Straw and Pease? Or, will Rye Straw and Rye feed them as well as Oat Straw and Oats? The Charge given by you to me was, to make Provision for your Horses, and I think I have done it. Now, having exonerated myself, I shall show you how to make more of your Clover Field than the Value of the Clover, even while it is growing.

Mix the Seeds of Weld with your Clover Seeds, and sow them together; or, as you think best, sow them separately, as Rye-grass and Clover Seeds are sown, and you will have both a Crop of Weld, and of Clover, in one and the same Year. This is an old Improvement renewed, and practised in
some

some Parts of *England*. Hear what Mr. *Blyth*, in his *English Improver improved*, said of Weld more than a hundred Years since, and observe how fit your Ground is, by his Account, for this Plant.

“ It being, *says he*, a rich Dyer’s Commodity,
“ beareth a long, narrow, greenish, yellow Leaf,
“ and bringeth furth a yellow Flower, which runs
“ to a small Seed, far smaller than Mustard Seed;
“ it is very thick set with Seed: *Pliny* calls it
“ *Lutea*, but *Virgil* calls it *Lutum*, which in our
“ *English* is *Weld*, or *Dyers Weed*. It flourisheth
“ in *June* and *July*: It in many Places groweth
“ of itself, and is of very great Use; and considering the easy Charge of raising it, and the
“ Badness of the Land on which it will grow, is
“ of an incomparable Advantage.

“ *First*, It will grow on very indifferent Land,
“ not worth above ten Groats, or half a Crown
“ *per Acre*: Yea, as some affirm, the veriest hilly,
“ barren, chalky, light Land, not worth twelve
“ Pence *per Acre*, will carry it, and bear it to very
“ good Purpose. But unto so barren Lands I shall not
“ give Encouragement, unless where there is little
“ or none better; but any indifferent Land, if it
“ be of a dry, warm Nature, will do very well.

“ *Secondly*, It will cost little in the managing;
“ for it requires no Tillage at all, no harrowing,
“ being to be sowed, when and where you sow
“ your Barley or Oats upon that Husbandry, without any Addition, unless you draw a Brush over
“ it, or a Roll, either of which is sufficient to cover it: The difficultest Piece in the managing
“ hereof is the very sowing of it, that is, that it
“ may be sown even; for the Seed being so very
“ small, will require both Skill and an even Hand
“ to scatter it: Some sow it, by taking it with one
“ Finger and the Thumb, others with the two
“ Fore-fingers and the Thumb; but neither of these
“ do I affect as the best Way, because they cannot
“ spread

“ spread it so well as they may with their whole
“ Hand: I therefore prescribe a Mixture with
“ Ashes, Lime, fine Earth, or some such Thing
“ as will best suit with the Weight of the Seed;
“ for if you could find out that which agreed both
“ in Weight and Bigness, then out of all Question
“ none to that to sow it withal.

“ A Gallon of this Seed will sow an Acre, which
“ had Need, to every Quart of Seed, to have two
“ Gallons of some of the aforesaid, and it must
“ be often stirred together, lest the Seed sink to
“ the Bottom, and so that Part sow thicker than
“ the other, and then cast it out at Arm's End, at
“ as good and even Compass as possibly you can.
“ This Seed, thus sowed, may grow up among
“ the Corn, and yet do no Prejudice; because it
“ groweth not fast the first Summer; but after
“ the Corn is cut, it must be preserved, and the
“ next Summer you shall receive, through God's
“ Blessing, a comfortable Crop.

“ You must be exceeding curious of the Ripen-
“ ing of it: If you let it grow too long, your
“ Seed will fall out; if not long enough, your
“ Seed will not be perfect, nor your Stalk neither;
“ and therefore observe both the Turning of the
“ Seed, and the Ripening of the Stalk, for I can-
“ not tell you which of either will admit of a
“ Dispensation; and as soon as ever you perceive
“ it near up to perfect Ripeness, you must down
“ with it, that is, pull it as you do Flax, by Hand-
“ fuls, and set it up to dry in little Stilches or
“ Stitches, until both Seed and Stalk be dry, and
“ so keep it, as you see Cause, for a good Market;
“ for it is to be sold for the Dyers Use, who will
“ sometimes give a very good Price, but at all
“ Times sufficient Profit, and go far to buy it,
“ from forty Shillings an Acre, to ten or twelve
“ Pounds an Acre; some say more. You may
“ barn

“ barn it up, and keep it and the Seed together
 “ till *March*, and then you may get out the Seed,
 “ by lashing or whipping it furth upon a Board or
 “ Door, which reserve for Seed: The Seed is of
 “ good Value, sometimes worth twenty Shillings
 “ a Bushel, sometimes ten, and sometimes more
 “ or less, as the Markets rise and fall: It coloureth
 “ the bright yellow and the Lemon Colours: The
 “ Stalk and Root are both useful, and must go to-
 “ gether to the Dyer.”

Here a Question, in Part already answered by
 Mr. *Blyth*, arises, and an Objection may be made.
 Does the Weld and Clover become ripe at the same
 Time? The Answer is, According to my Informa-
 tion, they do, if their Seeds be sown on the
 same Ground, and at the same Time. The Clo-
 ver will, indeed, be trampled, while the Weld is
 a-pulling: This, I own, must make the clean cut-
 ting of the Clover the more difficult: But, as the
 Clover is to be cut immediately after the Weld is
 pulled, in how small a Degree does this balance
 the Value of the great Quantity of Weld, that
 may be presumed to grow, without lessening the
 Clover much; a Value far above the highest Worth
 of all the Clover that can be supposed to grow, tho’
 there was no Weld amongst it?

If you shall say, Why then should not I sow, in-
 stead of Clover, the full Fourth of my Ground with
 Weld, since ’tis so profitable? I answer, Your Hor-
 ses would not, I am afraid, eat Weld; you must
 have them, and Provisions for their Maintenance:
 Moreover, I suspect greatly that ’tis a Robber of
 the Ground, and Clover is known to be both an
 Inricher and a Cleaner, and so the Strength of the
 Plan, which lies in putting always an enriching
 and cleaning Crop immediately after an impoverish-
 ing and fouling, would be broke, and it would be
 disabled from executing its proper office, *The put-*

R r
ting

ting the Ground into, and keeping it in good Heart with little Dung ; and the Spirit of the Earth would be weakened, the Weeds would prevail, and all the Dung you could make, or could, I fear, purchase at a moderate Expence, would be insufficient to bring your Ground into, or keep it in a Condition, to give you even tolerable Crops, if you proceeded in that Manner; especially as the Weeds would also rob your Plants of the greatest Part of the Benefit of the Dung: Moreover, Why do the best Husbandmen often sow Pease and Beans mixed? Is it not, because they cannot be certain if the Soil and the Season will prove equally friendly to both? The one may therefore not thrive, the other may; and so 'tis surely prudent for them to take two Chances rather than one: Is it not for the same Reason, that they frequently sow Wheat and Rye mixed? And is it not reasonable for you to be equally cautious, studious, and careful, to secure Crops to yourself by the like Prudence? You will possibly say, they have another Reason, The Beans will support the Pease, if they are rank. I say, your Weld will support your Clover, if it is strong. If Scruples still remain, try Conclusions in the following Manner, and satisfy yourself in the most convincing Way.

Sow neither Clover nor Weld Seeds on one Ridge of a Field; sow Clover Seeds without Weld Seeds on another, and on a Third sow both Clover and Weld Seeds, and so through the whole Field. If the Crop on the Clover Ridges is far more valuable than the Crop on the natural Grass Ridges; and if the Crop on the Weld and Clover Ridges far exceeds the Value of the Crop on the Clover Ridges, will you not then be convinced? And that it will be so, if your Seeds are good, and your Husbandry proper, I am fully persuaded; unless you let Beasts into the Field to destroy your Weld and Clover.

The

The natural Grass, being a Native of the Soil, can suffer Usage which will kill them; tho' it only be wounded, they will be at least stunted.

Strange! That I should be obliged to fight Battles for Clover almost every where in your Country: I have been ordered by some not to mention it in my Memorials to them, for which Reason I publish none of these. Many will persist in the erroneous Opinion, that natural Grass is the more valuable Crop, and also kindlier to the Ground. I do not mention you as one of the obstinately incredulous. No; your Reason obliges you to hear Reason, and to yield to the Force of it: Every Man has not such a Share of it; few will give it so fair Play: Weak Understandings yield fillily to Custom and Prejudice, and are led, as in Chains, by them.

I have heard Custom called a second Nature: The Power of it, methinks, supports the Propriety of the Expression; and what is stronger than Prejudice! The Force of Truth itself, prevails against it with the Judicious only: So powerful and commanding are they, that I have some Doubts, if I should have been able, without Aid, to have profelyted even Mr. Griffith: It was, therefore, lucky you are inquisitive; for by your Advice from London, which you showed me, you are informed that even the small white Clover, which on the same Ground bears commonly but about half the Burden of the great, is far preferable to natural Grass in all Respects. The honourable and ingenious Gentleman's Words are, *It carries, to my Knowledge, four Stones, where the natural Grass will but carry one.* And by your other Advice from the South, you are told, *That the great Clover is the strongest, best Food, and hath been the Means of improving Land more than any Grass.* These, with what I have said now and formerly, will, I hope, confirm you
in

in an high Opinion of it, for itself, and for its Consequences.

I will, notwithstanding, allow, that unmixed Clover made into Hay, is a fouler Food than Hay made of Rye-Grass, or natural Grass, and therefore not so fit for Hunting or Race-horses; neither would Bacon or Butter be, I believe, wholesome Food for Men, if they ate either of them constantly for a Half, or even a Quarter of a Year, without Bread, or getting them mixed with other Food; but are they therefore disused as unwholesome? What recommends, in many other Cases, the mixing of Things of different, yea contrary Qualities together? Is it not chiefly, that one Quality may correct and improve another, and render both the more palatable and wholesome? For what other Reason does my good Friend drink *Sallivocus*? Why do you drink *Punch* rather than *cold Drams*? Is it not because you think the Ingredients are safer, and better when mixed, than if you drank *Drams* for one Month, *simple Water* for the next, ate *Lemons* for the third, and *Sugar* for the Fourth, and always abstained from the other Articles?

Now, pray Sir, what makes Clover-Hay, especially Hay made of the second Crop of it, foul Food for Hunting or Race-horses, or other Horses that get Exercise seldom, but violent? Is it not that 'tis replete with superabundant fat Juices? What is it that makes Oat-straw, but more especially Bear-straw, too lean, tho' a clean Food for Work Horses? Is it not that 'tis defective of fat Juices? Would not the Mixture of them, therefore, improve both, and make the compounded Food wholesome and nourishing? Wherefore, I advise you to let your Clover-Hay stand in the Grass Ricks until your Barley or Bear be cut; and if you have not so much of them, as the Straw thereof may be of an equal Quantity to your whole Clover-Hay, until

* Punch made of Wine and Spirits equally proportioned.

until you cut as many Oats, as the Straw thereof will make up the Deficiency : Then thrash out the Corn, and mix your Hay and Straw as much as you can in a Stack, or in your Barn, where both will sweat, and the Straw will extract the superabundant Juices from the Hay, and enrich itself thereby; and the whole Composition will be more mixed, by the cutting and carrying it into your Stable for Use, and prove an excellent Food.

A Gentleman of a large Estate, with whom I am acquainted, feeds his Hunting-horses in this Manner, and is generally first at the Death: You pursue a more commendable Chace, harmless, profitable for your Family, and profitable for your Country: You promote Praise-worthy Industry by Example; you employ People by Sea and by Land, in your Mines, and at your Brass and Iron Works: Their Wages being duly paid, their Wives and their little Ones bless you, their Prayers are heard, and you are happy, and delight in the Music of your Hammers and Anvils. I am, &c.

A Letter from the Right Honourable the Lord Cathcart, now deceas'd, communicated to the Honourable The Society of Improvers in the Knowledge of Agriculture in Scotland.

THE sowing of Whins for feeding of Cattle takes mightily about *London* now; the dry thin Soil, that is good for nothing else, they manage in the same Way as for sown Grass; but, in place of that, they sow it in the Spring with Whin-feed: They mow the Whins that Summer, and continue to do so yearly thereafter. They reckon one Acre produces at the Rate of ten Loads, or ten Tuns, twenty Hundred Weight each: This they stack up. They have a Contrivance for chopping

chopping them; and they commonly cut at once as much as serves their Cattle for two Days: A Gentleman, who has tried them, assures me, that all his Horses, of every Kind, as well for Draught as for riding, eat them as readily as they do Hay; and he thinks them as good Feeding. This Improvement comes from *Wales*, where it has been practised these hundred Years.

Another Piece of Improvement, which I had from the Earl of *Halifax*, is that of burning Clay. Where-ever he meets with Heaps of Clay in his Grounds, that have been raised when there has been Occasion to make Ponds, or Things of that Kind, or when he has occasion to take out clay or Mud out of the Bottom of Ponds, Lakes or Ditches; all this he burns in this Manner: He takes a long Stretch of green Ground, the nearest to the Heaps. This Stripe of Ground he pares. The Turfs are set up to dry; which being gathered into Heaps at a good Distance one from another, serve for kindling of the Clay and Mud. The driest of the Clay is first laid on the Kindling, and when that is well in fire, Men continue to add of the Clay and Mud, even wet as they are, out of the Ponds or Ditches to the kindled Heaps, till the whole Quantity is burnt.

In *September* or *October*, the Ashes are led out, at the Rate of forty Tuns to an Acre of the poorest Grass, and spread immediately, so as to have the Winter-Rains to wash them in. My Lord reckons the Charge of managing one Acre in this Fashion costs him fifteen Shillings: Last Year, that Acre, that formerly was not worth half a Crown, produced him at the Rate of two Loads and a half of Hay, which was worth fifty Shillings.

Directions by Major Henbury in Wales, for sowing Whin-feed, and using the Whins, communicated to the Society by Captain, now General, Abercromby of Glassloch.

THEY should be sowed in *February, March or April*. Six Pounds will sow an Acre. The Place where they are sowed must be made very free of Grass, and all Sorts of Cattle must be kept out. One Acre will produce fifteen Tuns, which will feed as far as fifteen Tuns of Hay.

The Time to begin to cut them is in *October*, or sooner: They will continue to grow till *Christmas*, and be fit for Use till *March*. When you give them to the Horses, they must be bruised by a Mill, or otherwise be pounded, and given in a Day after they are bruised; if you give any chopped Straw with them, it will do very well. A hundred of Straw will serve for a Tun of Furz.

The Furz must be cut, only what is the Growth of one Year, beginning in or before *October*.

The Major has fed sixteen Horses with them from *October* till *March*.

The sowing of Whin-feed in a very dry, light Soil, is surely good Husbandry, though some may think otherwise, because it is unprecedented in *Scotland*, and the foregoing Directions concerning the Practice of it seem to be sufficient: But I humbly think, that the Success of burning Turf and Clay, by the above Direction, is not to be depended on so certainly, as by the Methods directed in an anonymous Pamphlet, published anno 1741, and entitled, *A new Method of improving cold, wet, and barren Lands; particularly clayey Grounds*.

This

This Pamphlet being now so scarce, that I could not find a Copy of it in the Bookfellers Shops at *Edinburgh* or *Glasgow*, I shall give the Rules therein offered for burning Turf and Clay, a Place here, expecting they, with a few Alterations, will be acceptable to the Readers: These Papers follow.

A new and cheap Method of burning dry Turf, or Mole-hills.

*Prima ferè vota, et cunctis notissima templis,
Divitiæ ut crescant.* JUVENAL.

“ **T** Here is nothing that can enrich the Farmer
“ so soon, as the Improvements he may make
“ in his Lands by burning them, which seems at this
“ Day to be very little understood, and much
“ less practised.

“ As Fire evaporates the fluid Particles of the
“ Earth, and reduces the Salts to a less Compass;
“ so it has been found by long Experience, that the
“ Ashes of Turf or Mole-hills, and indeed almost
“ all Ashes, have been of very great Service in the
“ Improvement of Land, especially such as lies
“ wet, to which I confine myself.

neve

Effætos cinerem immundum jaculare per agros.
VIRGIL.

“ The vulgar Notion is, that Fire makes Salt;
“ because they taste a Salt in Ashes, which they
“ could not do, before the Body underwent the
“ Operation of the Fire; but Fire cannot constitute
“ or make Salt from any Earth, vegetable or mi-
“ neral: It only separates or brings it to a lesser
“ Compass, for all Principals are unalterable.

“ In

“ In making Ditches or Ponds, when the first
“ Spit is plowed, or dug up, and thoroughly dry,
“ or after plowing up Mole-hills, and they are
“ dry, dig four Channels, thirty Feet long each,
“ six Inches deep, six Inches wide, and join them
“ in the Middle, where they cut each other, and
“ cover them over with Bricks or Slates, except
“ in the Middle, which must be left open for a
“ Chimney, and is to be built in this Manner, *viz.*
“ Over the four Bricks which were laid in the
“ Middle, lay four more in parallel Lines, which
“ continue till they are carried up to nine
“ Feet high, and then lay some loose Turf or
“ Mole-hills round the Chimney, eight Feet high,
“ to keep it from tumbling down, and round the
“ Turf, put twenty-five good Wood Faggots up
“ an End, and over them lay some Cord-wood,
“ but not so high as the Top of the Chimney;
“ and from the Faggots lay one Length-ways on
“ each Channel, pointing towards the End of it;
“ then take some more Turf or Mole-hills, and
“ lay round about the Faggots, till the Faggots are
“ covered that were laid Length-ways on the
“ Flews, and till the Cord-wood is covered two
“ Feet thick; then observe to which of the four
“ Channels the Wind blows, and open it to set
“ Fire to the Faggot; for which always chuse the
“ Morning, because the Heap requires a little ex-
“ traordinary Attendance at first Lighting.

“ Before the Fire is lighted, stop up all the
“ Holes in the Sides and Top of the Heaps where
“ the Heat may get out, (except at the Chimney)
“ with small Pieces of Turf, and clear out the
“ Channels.

“ Half an Hour after it is lighted, the Top will
“ begin to sink, which fill up gradually with the
“ thinnest and dryest of the Turf or Mole-hills, as
“ the Fire breaks through: This Method is to be

“ continued for the first Day and Night, because
“ it will want a Supply every Hour, or less ; after
“ that Time thick Turf or Mole-hills may be laid
“ on where the Fire comes through ; but it must
“ be attended Day and Night.

“ As the Heap increases, extend the Channels
“ always three Feet on the Out-side of the Heap,
“ and keep them covered with Bricks as far as
“ the Heap spreads ; and at the same Time let
“ the Chimney be always raised at least a Foot a-
“ bove the Heap.

“ It will burn fastest at the Top, if it be not
“ prevented, by pitching some Holes in the Sides
“ and Bottom, to draw the Fire that Way ; and
“ stop the Channel which is opposite to the Place
“ where it burns least, till such Time as it burns
“ all alike, and then open it again.

“ While this Method is followed, there is no-
“ thing can hurt the Fire, except excessive Rain ;
“ in which Case lay a good thick Cover of Turf
“ or Mole-hills on it, to prevent the Rain from
“ getting to the Fire.

“ There may be half a Dozen of Heaps burn-
“ ing at the same Time ; for one Man can look
“ after them all, which will save considerably to
“ the Farmer.

“ When the Heaps are burnt, lay fifty or sixty
“ Loads (twenty-five Bushels to a Load) on an
“ Acre : But in case the Ground is full of Rushes
“ or green Weed, then a hundred Loads are little
“ enough.

“ The best Way to spread it is with a Shovel
“ out of a Cart, and afterwards to break the Lumps,
“ and roll it two or three Times on Pasture and
“ Meadow Lands, where it produces the white
“ Clover ; and when laid on a Fallow for Winter
“ Corn, it prevents the Seed from rotting with
“ the cold Rains, and the Worms from eating it.

“ It

“ It may be laid on Meadow or Pasture at any
 “ Time when the Grass is off, and on a Fallow be-
 “ fore the last Plowing, which will make it resem-
 “ ble *Horace's Farm* :

————— *hic tibi Copia*
Manabit ad plenum benigno
Ruris honorum opulenta cornu.

HOR. Lib. I. Car. 17.

A New Method of burning CLAY in a Clamp.

Fly no Opinion, Sir, because 'tis new ;
But strictly search, and after careful View,
Reject if false, embrace it if 'tis true.

“ THE following Description of a Clamp, and
 “ the Method of burning it, are so plain,
 “ that I hope the meanest Capacity will under-
 “ stand them : The Clamp is calculated to burn
 “ 200 Load.

“ When the Place is fixed on for the Clamp,
 “ which should always be in or near the Field
 “ where the Ashes are to be laid, level Forty-two
 “ Feet of the Ground in Length, and Twenty-two
 “ in Breadth, on which mark out with a Line, six-
 “ teen Feet long, nine Channels, four Feet distant
 “ from each other, six Inches deep, and six In-
 “ ches wide. Then extend the Line to Thirty-six
 “ Feet in Length, and make three Channels, four
 “ Feet distant from each other, across the other
 “ nine of the same Breadth and Depth with them.

“ Lay the Turf and Mould that is dug out of the
 “ Channels in the Middle of the Squares which
 “ they make, and then cover the Channels over
 “ with Bricks, or Slates, as close as possible, (ex-
 “ cept

“ cept on the three Places where the Channels
“ cut each other, which must be left for Chim-
“ nies to attract the Air from all the Channels)
“ and after the Bricks are laid, shovel the Turf
“ and Mould in the Middle of the Squares to the
“ Sides of the Bricks, to keep them from tum-
“ bling into the Channels; for if any of them
“ should tumble in, or any Dirt should stop up the
“ Channels, it will be very difficult to make that
“ Part of the Clamp burn even.

“ When the Bricks are laid, build a Wall be-
“ tween each Channel three Feet high, of the
“ largest of the dry Turf or Mole-hills. The Walls
“ need be no thicker than will support them to
“ that Height.

“ Then build the two End-walls one Foot thick
“ with wet Turf or Clay, three Feet high, and
“ leave a Hole nine Inches square over each Chan-
“ nel, to set Fire to the Clamp, in case the Wind
“ should be in that Corner when it comes to be
“ lighted.

“ After this take some Bricks, and raise the three
“ Chimneys, by laying the Bricks parallel to each
“ other three Feet above the Walls, and round the
“ Chimneys lay some Clay, to keep them from
“ tumbling down when the Faggots and Cord-wood
“ are laid in.

“ When the Chimneys are finished, lay some
“ Straw, Fern, or Heath, over the Channels be-
“ tween the Walls, and croud as many Bayins or
“ Faggots over the Straw, Brakes, or Heath, as can
“ ly within the Walls.

“ Then build up both the Side-walls exactly as
“ the End-walls, leaving a Hole nine Inches square
“ over each Channel, as in them.

“ After this lay three Cord of large Wood (no
“ Matter whether green or dry) or Peat, over the
“ Bayins or Faggots, as close as possible, to keep
“ the

“ the Clay from tumbling in on the Faggots before they are thoroughly lighted.

“ In Case there be any green Bushes, or Brakes, or Rushes, near the Place, that can be spared, fill up the Holes between the Wood with them, and that will prevent the Clay from tumbling in better than any Thing else.

“ When the Holes between the Wood are stopt, raise the Out-side Walls and End-walls as high as the Logs or Peat ly, and cover the Clamp all over, two Feet thick, with large Pieces or Spits of Clay, the larger the better, and fill up all the little Holes between the large Spits of Clay, with small Pieces of Turf or Clay, to keep the Heat in.

“ Then get some wet Clay and Mould, beat together like Mortar, and plaister the Walls all round the Clamp, for three Feet from the Ground, for they will all fall in to that Height.

“ After this open all the Channels round the Clamp, three Feet from the Out-side Walls, but there is no Occasion to cover them over with Bricks, and get twenty Load of Clay laid round the Clamp, to be ready to throw up as the Fire shall break through. Before the Clamp is lighted, observe how the Wind blows, and stop up all the Holes over the Channels, quite round the Clamp, except these that face the Wind, where set Fire to the Straw, or Brakes under the Bavins or Faggots, with a Candle or Fire-brand, for which chuse the Morning.

“ In half an Hour's Time the Bavins or Faggots will be lighted, when all the Holes over the Channels, quite round the Clamp are to be close stopp'd up, and every Crack where the Smoke comes out in the Walls, is to be plaistered with wet Earth or Clay.

“ After

“ After the Clamp has been lighted an Hour,
“ the Fire will break through the Top, and the
“ Clay that was first laid on will sink down as the
“ Faggots consume, but there is never any Clay
“ to be laid on but where the Fire breaks through,
“ and that at great Leisure.

“ Before Night it will be all even with the three
“ Feet Walls, when a Board should be laid across
“ it for the Men who attend to supply it, with-
“ out any Danger of falling in among the Fire,
“ and then all the Clay that lyes on the cross Walls
“ should first be thrown down, to fill up the Pla-
“ ces where the Fire comes through, before fresh
“ Clay is thrown up.

“ In the Night the Places where the Fire breaks
“ through will appear white, and in the Day black,
“ which serve as a Guide to lay the Clay up.
“ Before Morning the twenty Load of Clay will
“ be burnt, when the same Method is to be con-
“ tinued; but if any Place of the Clamp happens
“ not to burn so fast as the rest, pitch a Hole
“ or two in it with an Iron Pitcher, or Crow, and
“ stop up the Channel that is opposite to it, till
“ it burns alike with the rest.

“ While the Clamp is burning, keep the Chan-
“ nels free from Dirt, and raise the Chimneys and
“ the Out-side Walls at least half a Foot above
“ the Middle of the Clamp always, and let the
“ Walls be constantly plaistered where the Heat
“ comes through, and make them incline, or bat-
“ ter a little to the Center.

“ There is an absolute Necessity to attend it
“ Day and Night, to prevent the Fire from being
“ exposed to the Air, which would certainly put
“ it out.

“ By observing the above Directions, there is
“ nothing but a Deluge of Rain to stop up the
“ Flews, that can hurt the Clamp, which may be
“ prevented

“ prevented by making it on a rising Ground, and
 “ then there is nothing can do it any Mischief,
 “ but Carelessness; for I saw a Clamp burnt in
 “ November, when there were not six Hours of
 “ fair Weather together all the Time it was burn-
 “ ing.”

*The following is an Account of the real Ex-
 pence of burning two Hundred Loads of Clay,
 viz.*

	£.	sh.	d.
“ T O 200 Bavins, Faggots, or any			
“ other small Wood — —	0	18	0
“ To three Cord of Logs, or Cord-			
“ wood — — —	1	10	0
“ To digging and throwing up 200			
“ Loads of Clay, at 4 d. per Load	3	6	8
“ To Straw and Carriage of 750 Bricks	0	7	0
	<hr/>		
	6	1	8

N. B. *There is nothing can be charged for the Bricks,
 except Carriage, because they are the better for
 burning.*

“ The above Estimate is made at the highest
 “ Rate it can bear; for a Farmer who has got Ma-
 “ terials, and Hands to dig it, or who plows it,
 “ may really burn two hundred Loads for three
 “ Guineas at most, as any Gentleman, who is
 “ conversant in Husbandry, will soon be convinced
 “ of by the above Estimate.

“ When the Clamp is burnt as high as a Man
 “ can throw a Spit up, which is twelve Feet,
 “ and the Fire burns quite through the Top and
 “ Sides, (which will be eight Days after they have
 “ done throwing up Clay) then pour about forty
 “ Pails

“ Pails of Water on the Top of it, and that will
 “ help the Ashes to run the sooner.

“ Before the Ashes are carried out into the
 “ Field, strip the Top and Sides of the Clamp of
 “ all the Pieces that are not thoroughly burnt,
 “ which lay in a Heap, and burn as directed for
 “ dry Turf and Mole-hills.

“ Thirty Loads of the Ashes of the wet Clay,
 “ (twenty-five Bushels to a Load) will be sufficient
 “ for an Acre of Pasture or Meadow Land, unless
 “ they be full of Green-weed, Rushes, Horse-
 “ prickles, Fox-tail, &c. and then fifty Loads may
 “ be laid on, in the same Manner as directed for
 “ the Ashes of dried Turf and Mole-hills.

“ This Manure should be laid on in the Winter,
 “ because it will destroy noxious Weeds or Plants
 “ that these wet Lands generally produce; and
 “ likewise the Sword-worm, and other Kinds of
 “ Insects that injure the Pasture: It generally pro-
 “ duces the white Clover.

“ When it is used for a stiff, clayey, or loamy
 “ arable Land, for which Sorts it is properest,
 “ fifty Loads should be laid on an Acre.

“ If it is intended for Wheat, it should be laid
 “ on about *Michaelmas*, before the last Plowing;
 “ but for *Lent* Corn, in the Spring, before the last
 “ Plowing: In both Cases plow it in but shallow,
 “ to prevent its being buried too deep, before it
 “ is well incorporated with the Soil; but the best
 “ Way for arable Land is to burn the Clay in *May*
 “ or *June*, and lay the Ashes out upon a Sum-
 “ mer-fallow, as soon after as may be for a Crop
 “ of Turnips, for which this Amendment is par-
 “ ticularly beneficial, by destroying the Fly, and
 “ producing great Crops beyond Lime or any o-
 “ ther Sort of Manure.

“ In case any Farmer shall think that this Sort
 “ of Land is not so proper for Turnips, or feed-
 “ ing

“ ing them off, on account of its being too wet
 “ for that Purpose, that Inconvenience may be
 “ easily avoided, by ridging and water-furrowing
 “ the Land when the Turnips are sown, which
 “ will keep it dry enough to feed Sheep on, as is
 “ frequently experienced on the cold clayey Soils
 “ in *Northampton-shire, Leicester shire, Suffolk,* and
 “ other Counties : But in case any extraordinary
 “ wet Season should render it impracticable to
 “ feed them off, the Sheep, or other Cattle, may
 “ be confined under some Shed, or in some Pen,
 “ and the Turnips pulled up and carried to them ;
 “ and if any are left by the fatting Catle, they
 “ will be useful to feed Hogs with.

“ During the Time that the Sheep are fatting
 “ on Turnips, their Pen should be littered to keep
 “ them from the wet Ground.

*Et multa duram stipula, filicumque manipulis
 Sternere subter humum : glacies ne frigida lædat
 Molle pecus, febremque ferat, turpesque podagras.*

VIRG. Geor. Lib. III.

“ And after ten Days feeding on the Turnips,
 “ they should have a Rack or Cratch, with a small
 “ Quantity of old, dry, sweet Hay, always stand-
 “ ing by them, which will greatly contribute to
 “ their Health, and feeding kindly.

“ Notwithstanding that the above Method of
 “ burning Clay in a Clamp is so easy and plain,
 “ and of so great Advantage to wet cold Lands, it
 “ is not to be expected that many Farmers will ven-
 “ ture to burn it before their Landlords set them
 “ an Example : But if once Noblemen and Gentle-
 “ men give them a Pattern, they will soon copy ;
 “ for it may justly be applied to the Farmers what
 “ *Pliny* remarks of the People's following the
 “ Manner of their Prince, *Flexibiles in quamcunque*

“ *partem ducimur à principe, atque, ut ita dicam, se-*
 “ *quaces sumus: Huic enim cari, huic probati esse cu-*
 “ *pimus, quod frustra speraverint dissimiles. Eoque*
 “ *obsequii continuatione pervenimus, ut prope omnes*
 “ *homines unius moribus vivamus.*

“ The Ashes of Clay, when burnt wet, are
 “ much better than those of Mole-hills or Turf; for
 “ Experience shows, that a Peck of Clay contains
 “ twice as much Salt as a Peck of Loam, and four
 “ Times as much as the same Quantity of Sand.

“ From this it might be imagined, that a clayey
 “ Soil was the best for Plants, which is contrary
 “ to Experience; for the Parts of the Clay being
 “ close knit together, do not so easily give out
 “ their Salts as a looser Mould; nor can the tender
 “ Fibres of the Plants make their Way through it
 “ in Search of their Food, unless it be better pul-
 “ verised than commonly it is.

Mr. Evelyn in his Practical Discourse on Earth
 says, *That Clay when dried, as seen through a Micro-*
scope, consisted of exceeding smooth, round Sands, of
several opacous Colours. And Monsieur de la Quintinie
attributes all the Difference we find in Soils, to the
different Quantity of Sand mixed in them.

“ I confess I am of a different Opinion, and think
 “ that Sand of itself, could hardly constitute such
 “ a stiff glutinous Body as Clay; for we never
 “ find any Springs in Clay, but commonly in
 “ Sands or Gravel; both which Experience shows
 “ to be of a very different Nature from Clay: Sand
 “ and small Gravel are often used with great Suc-
 “ cess as Manure for Clay, which they attenuate
 “ and open much better than Dungs.

“ Any Manure that is laid on stiff clayey Lands,
 “ such as Horse Dung, Cow Dung, Sheep Dung,
 “ or any Sorts of Dung that do not change the
 “ Nature of the Soil, so as to render it loose and
 “ open, lasts but a short Time; for it requires a

“ Manure

“ a Manure of a very contrary Nature from Clay,
 “ to make it pay the Farmer well.

“ It is plain from this, that the Particles of Clay
 “ cannot (as Mr. *Evelyn* asserts) consist of small
 “ round Globules like Sand, because round Glo-
 “ bules in contact with each other touch but in
 “ one Point, and therefore leave Interstices be-
 “ tween them, which would admit Water to pass
 “ through them: But every Farmer knows, that
 “ Clay will hold Water like a Bowl-dish, which it
 “ would not do if it consisted of small round Glo-
 “ bules like Sand; neither could such round Glo-
 “ bules form so close an Adhesion of Parts as we
 “ find in Clay.

“ When Clay undergoes the Operation of the Fire,
 “ it relaxes all its Pores, and, by bringing the Salts
 “ into less Compass, gives it a strong Effervef-
 “ cence, when it meets with a proper *Menstruum*,
 “ and more easily promotes the Fermentation
 “ necessary to Vegetation.

“ We find that Egg-shells or Oister-shells cal-
 “ cined, have a greater Fermentation with Oil of
 “ Sulphur or Vitriol, than when uncalcined; be-
 “ cause the several Principles of which the Shells
 “ consist being relaxed, and the greater Part of
 “ the Sulphur driven away by the Fire, the re-
 “ maining Salt lies more open and naked to the
 “ Attack of the *Menstruum*, so soon as ever they
 “ are mixed together.

“ The same Reason holds good in Clay, Lime-
 “ stone, and Chalk, because the Salts they con-
 “ tain endure the Fire, and come purer out of it,
 “ as being freed of their Humidity.

“ The Chemists describe Salt to be a simple,
 “ acid Substance, which enters the Composition
 “ of all Bodies, and hold it one of the five Prin-
 “ ciples or Elements thereof.

“ Since

“ Since it now appears that Salts are the Prin-
 “ ciples of Vegetation, and Clay produces them in
 “ such Plenty, I hope the landed Gentlemen will
 “ promote the burning of it, by which the wet
 “ clayey Grounds that are now of small Value,
 “ may in Time present them with the following
 “ beautiful Landskip :

*Ver ubi longum, tepidasque præbet
 Jupiter bruias, et amicus Aulon
 Fertili Baccho minimum Falernis
 Invidet uvis.*

HOR. Lib. II. Car. 6.

*You have heard that nothing can enrich the Farmer
 so soon, as the Improvements he may make in his
 Lands by burning them; but as the Practice of
 it must, in some Cases, hurt the Proprietor, who
 therefore should secure himself from the Danger,
 by a Covenant in the Lease, properly framed for
 that Purpose, I shall, for making the Matter the
 more fully understood, subjoin the two following Pa-
 pers.*

“ **T**HE Dublin Society examined the Claims of
 “ the Candidates, for the Premium of 10 l.
 “ to the Person who should raise the greatest Quan-
 “ tity of Wheat off one Plantation-acre, in one
 “ entire Piece, in the Year 1742, when Mr. Mat-
 “ thew Yelverton of Portland in Lower Ormond, Tip-
 “ perary, who had off one Plantation-acre, 668
 “ Stone, 11 lb. which at 20 Stone to the Barrel,
 “ makes 33 Barrels, 8 Stone, and 11 lb. obtained
 “ the Prize. This being the greatest Quantity e-
 “ ver known in any Country, to be produced
 “ from the same Quantity of Land, perhaps the
 “ Curious

“ Curious may desire to know the Method used
“ to raise this Crop.

“ The Field, on Part of which Mr. *Yelverton's*
“ Crop was raised, contained in all about six Acres;
“ five of these were under Wheat, and the sixth
“ being moister than the rest, was sown with Bear,
“ which yielded him from 10 Stone of Seed, 38 Bar-
“ rels and 1 Peck of clean Bear; the other five
“ Acres have each of them returned a Crop in all
“ Appearance equal.

“ The Soil was old Ground, not tilled these 30
“ Years, of a loose and mellow Earth, inclining
“ to Sand at Bottom. This was plowed an Inch
“ in Depth in the Beginning of *August* 1741, with
“ Ploughs that carried Wings 10 Inches broad at
“ the near End, running taper, and ending in a
“ Point, as usual, at the Fore-end of the Sock.
“ These Ploughs are in every other Respect the
“ same with the old *English* Plow, whose Beam is
“ not above eight Feet and a Half in Length, and
“ were drawn by Oxen with Yokes.

“ The Sods raised by this shallow Plowing were
“ burnt about the 8th of *August*, and the Ashes
“ spread equally and with great Exactness over
“ the Surface of the Ground. It then received
“ another thin Plowing, and afterwards remained
“ in that Condition from *August* 16. to *September*
“ 12. following. At that Time, Mr. *Yelver-*
“ *ton* set in large Harrows, with Iron Pins about
“ ten Inches long, and harrowed the six Acres
“ cross the Ridges; which not only broke the Sods,
“ but mixed the Mould and Ashes thoroughly to-
“ gether.

“ He then observed, that the Soil was too rich
“ and mellow for Wheat, and upon that Account
“ determined to give it another Plowing, deeper
“ than the former, to raise the Sand, which lay
“ at no great Distance from the Surface. This
“ Resolution

“ Resolution was executed by *September 22.* the
“ Sand he mixed with the Mould and Ashes, by
“ harrowing his Ground with the same weighty
“ Harrows. As the Land was harrowing, and while
“ it was loose and mellow, he was sowing it ;
“ and this last Article of Tillage was finished *Oc-*
“ *tober 6.* so that from his entering on the Ley
“ to his putting Seed into the Ground, the whole
“ Interval cannot exceed two Months. This is
“ expeditious Tillage, and the Success of it per-
“ haps might be apt to tempt the Farmer to imi-
“ tate it without Caution. But the Reader should
“ observe, that the Ground was rich, loose and
“ mellow in its Nature, and sandy at Bottom ;
“ that besides, the Sod was burnt, and in so
“ dry and favourable a Season, that the plowing
“ and burning six Acres did not take up eight
“ Days.

“ All these Operations on the Ground were
“ performed in dry Weather; and Mr. *Yelverton*
“ thinks it of great Importance to the Farmer,
“ not to stir his Soil when it is wet. One of these
“ six Acres was laid out in broad Ridges, 16 Feet
“ over from one Furrow to the other: In these he
“ plowed in his Corn, and where the Plough had
“ left Opens in the Ground, he covered them
“ carefully with the Spade; the rest were thrown
“ up in high Ridges, of eight Turns of the Plough
“ to every Ridge. Between the Crops there was
“ no Difference to Appearance from this Circum-
“ stance, but, if they were covered equally with
“ Corn, the broader Ridges must have the Advan-
“ tage of the narrow Ones, less Ground being
“ lost by Furrows.

“ Tho’ he had excellent Wheat of his own
“ Growth, Mr. *Yelverton* observed the usual Cau-
“ tion of changing the Seed, and used the red
“ *English* Wheat. He sowed of it on the five
“ Acres

“ Acres 49 Stones 4 Pound, somewhat less than
“ half a Barrel to the Acre, and a good Deal of
“ his Success he attributes to this Caution. Had he
“ loaded his rich Soil with a greater Quantity of
“ Seed, he believes it would have ruined his Crop,
“ and possibly, from the Richness of his Corn in
“ Spring, even half a Barrel was too much.

“ The Seed was steeped the Evening before
“ sowing in a Pickle, and fitted for Use next Morn-
“ ing, by riddling hot dry Lime over it, as usual.
“ The Pickle was thus made: Take Roche-lime
“ and Bay-salt, put them together in a large Kieve,
“ then throw in a sufficient Quantity of Urine or
“ Stale, still stirring them, till they dissolve the
“ Salt and flake the Lime; let them continue so
“ 24 Hours, and then let the Liquor run out of
“ the Kieve into another Vessel for Use: The
“ Corn should remain from Night to the Morn-
“ ing in this Pickle before sowing. This Steep
“ prevents the Smut, and destroys a pernicious
“ Insect, which he calls the small red Worm, of-
“ ten destructive to Seed, especially in rich old
“ Grounds.

“ Tho' he had sufficiently loaded both the broad
“ and narrow Ridges, yet he was under a Necessity
“ of mowing the five Acres about *April* 15th,
“ by Reason of the Rankness; and the Field grew
“ so excessive fast, that he was obliged to reap the
“ Top of it with Hooks about *May* 16th, because
“ it was then too near shooting to use the Scythe,
“ which might have gone too deep: but, had he
“ neglected this, or had the Weather proved wet,
“ the whole Crop would certainly have lodged and
“ rotted. In favourable Seasons he has had before
“ this Time from 20 to 25 Barrels off an Acre;
“ and, if the Weather proves as good, he makes
“ no Question of having a Crop next Year equal
“ to the Crop which has occasioned so much Won-
“ der.

“ der. By an original Account of the Sale of that
 “ very Crop off one Acre, the Number of Sacks are
 “ 32 ; the Weight, after the Deduction of the Toll,
 “ and Loss by Carriage, is 640 Stones; and the
 “ Sum Total, for which they were sold at *Galway*,
 “ 21 *l.* 4 *sh.* 11 $\frac{1}{2}$ *d.*”

The Author of the Scots Magazine, having asked my Opinion, if he should publish the preceeding Account of Mr. Yelverton's Husbandry ; and my Answer being, That it should be done with a Caution : He desired me to communicate my Thoughts concerning it in a Letter to him. Which I having wrote, he inserted both in his Magazine for March 1743. My Letter follows.

S I R,

I HAVE seen an Account of the Husbandry by which Mr. *Yelverton* got a vast Crop, and a Premium of 10 *l.* for raising it, from Ground that was rested 30 Years, and rich, loose and mellow in its Nature ; but of so thin a Staple, that, when he had pared and burnt it, the Plough brought up Sand.

He took a good Way indeed to obtain the Premium. For the cineral Salts being spread upon the rich, loose and mellow Earth that was left, could not fail to ferment therewith, and reduce it into an infinite Number of Parts ; and minute Particles are the chief Food of Plants. Besides, the Sand, hot in its Nature, and made hotter by the burning of the Earth above it, would as certainly co-operate with the Ashes, when mixed with them, to make the Fermentation the greater, and the Particles the more minute ; and by the repeated Plowings, the last still the deepest, the Fermentation would be as often renewed and heightened, and so the Parts would be more and more divided.

But

But such an Account should be published with a proper Caution.

Paring and burning of Earth, so rich, and of so shallow a Staple immediately above Sand, is a pernicious Practice: For the Staple is not only diminished by burning of the upper Part, which is the richest, especially of long rested Grounds; but the Remainder is exhausted to so great a Degree, by feeding the Plants which grow luxuriantly upon Earth so highly fermented, and finely pulverised, that thin Fields are destroyed, and, after a few Crops of Grain, rendered scarce worth the Name of an Inheritance.

The Value of some Land, I shall allow, may be got by Means of the Ashes that will arise from paring and burning the Surface of it: But, is rich, loose, mellow Ground, of so thin a Staple that the Plough raises the Sand, to be converted into Cash, and possibly squandered away? Or, is the intrinsic Value of a Kingdom to be lessened by burning, by which it is possible at last to make it all barren and unfruitful? No; we ought to use our Mother Earth tenderly, that she may remain in a Condition to afford us the Staff of Bread; we ought to feed and cherish her, that she may feed and cherish us in Return; and to this End it is prudent, and more commendable Husbandry, to disregard a more immediate Profit, and to superinduce proper Earth from Parts of a deep, to Parts of a shallow Staple, than, by paring and burning, to waste thin Fields in such a Manner, that they can never thereafter equal the same Sort of unburnt Land, if both are managed in the same Way.

I own, nevertheless, that, where the Stratum under the Staple is of a better Quality than the Staple itself, or where the Staple is so deep that it can well bear a Diminution of some Part of it, the Practice of paring and burning is in either

U u

of

of these Cases most approvable, and should be encouraged: For what can equal the Benefit of Ashes, by causing Ground yield so much Corn in so short Time? And if Ground be once brought into good Heart, the judicious Husbandman may keep it so, if a sufficient Quantity of Earth be left to work upon.

From these Observations it seems plain, that paring and burning is good or bad Husbandry, as it is prudently or imprudently practised. *I am, &c.*

*An ESSAY on the Husbandry of SCOTLAND,
with a Proposal for the Improvement of it.*

WE, in this Country, being deficient in publishing Instructions adapted to the State of our Husbandry; I offer this Essay, which I think may tend to the Advancement of it, hoping for a favourable Acceptance of my Endeavour, seeing the Improvement of our Land is both practicable, and the surest Way of promoting the Interest of the Kingdom.

The Improvement of Husbandry in all Countries is gradual, and, as other Sciences, propagated from the South to the North. The *English* have learned the Husbandry they now follow from the *Flemish*, they from the *French*, and the *French* from the *Italians*; and it is the same which the old *Romans* practised. The present Husbandry in *England* was fifty or sixty Years ago little better known there, than here at this Day, and at first thought only proper for the more Southern Countries.

The Soil of the Southern Parts of *Scotland* is as good as in *England*, and if cultivated as theirs, would produce whatever their Ground yields; and their Land, husbanded as ours is, would give

no more than ours does. The good Season comes to us a little later; but when we have it, 'tis as good, and lasts long enough to bring any Thing they husband in the Fields to Maturity with us. Their greater Heat in the Southern Parts is often a Loss to their Husbandry; so the Difference betwixt this Country and *England*, does not so much proceed from the Soil and Climate, as from the Husbandry: We often blame the Country for what is our own Fault; and, slighting the good Husbandry they follow, think to bring ourselves off, by saying, *They have the Sunny Side of the Brae of us.*

Husbandry, till of late, was intirely managed in *Scotland* by the Vulgar, who, like Moles, ran on blindly in the Track their Fathers had made before them, and continued Husbandry, probably, in the same State, from the first Planting of the Country; and it must have continued so, without much Alteration, if it had not been attempted by those whom the Opportunities of seeing and reading of the Practice of other Countries, made capable to improve it.

Their Method was, dunging for a Crop of Bear, after it taking a Crop of Oats, and so on; dunging the one Half of their Arable every Year as long as they lived. This is the Practice in the Northern Shires to this Day.

In this Way the Corn costs almost as much, by the great Expence of Servants and Cattle, as 'tis worth when it is reaped, considering the Quality, the Badness whereof is occasioned by this Management. Indeed, if the Tenants had not as much Land beside their Arable, as is sufficient alone to pay their Rents, they could never carry on their Husbandry in the Manner they do.

Gentlemen of this Country ought to consider, that this is setting two Farms to pay the Rent of one;

One; and that by bringing in a better Method of Husbandry, we may not only double our Rents, but enrich our Tenants: An easy Way to do this, would be to bestow the Dung and Labour upon that Part of the Ground which lies uncultivated; the other Part, which has been so long dung'd, might turn to good Advantage without it.

The first Alteration made on this Husbandry, was the making Folds for Cattle, and the sowing of Pease, which the People living next to *England* learned from thence; but this is not carried into the North Country, altho' we have many Cattle, and that Vetches, or Mouse-pease are to be got, which are very hardy, in case the other Sort of Pease be thought too tender.

Altho' the sowing of Pease be a considerable Improvement, they opening and cleansing the Land where they thrive; yet, as by the too long continued Sowing of Bear and Oats, it is apt to grow foul, and to bind, whereby the Pease come to fail, they, instead of improving the Land, harm it: For, as is found by Experience, Grass prospers among weak Pease; wherefore if they do not destroy, they encourage it. For this Reason some chuse to sow Pease, or Vetches, with their Grass Seeds, and to cut them down before they begin to ly.

Some of our Farmers in the South, finding that Pease did not prove good and sure Crops, have lately fallen into an Improvement, which hath been long practised in *England*, perhaps ever since the *Romans* were in *Britain*, who probably brought it in, as best suited to the uncultivated State of the Country at that Time; I mean Fallowing, whereby the Land is freed from the Inconveniences of the former Husbandry, cleansed and mellowed, and enabled to do more than make up for the lost Crop in these succeeding; but they, by a
Piece

Piece of mistaken Avarice, take four Crops instead of three, which their Neighbours, from whom they learned it, only take.

The Husbandmen in these Places where Fallowing hath obtained, plow, and cultivate their Land tolerably well ; but as Husbandry is a Scene of vast Extent, I would not have them believe that they have come at the outmost Point, and can go no further, but to know, that as they have improv'd upon the Practice of former Ages, so there is still Place for further Improvements, and that all that they have done, is only to have made their Land fit for another Improvement, which will fetch them in much more Money.

'Tis many hundred Years since Fallowing has been laid aside by good Husbandmen, in *Italy*, *France*, and *Flanders*, and of late by these in the Southern Counties of *England* likewise ; and, in Place thereof, they have substitute Turnips, which they find answer all the Designs of Fallowing to far better Purpose.

As this Method seems to strike at one of the received Fundamentals of our Husbandry, which is *Rest*, and to bring us back to the *Egypt* which we had left, of cropping the Land perpetually, it will be necessary to explain a little the Nature of Plants, and the Effects of Fallowing.

Plants have very different Effects upon the Ground which produces them : One Kind is of a meliorating Nature, and the Land where they grow is improved and enriched by them ; the other, by exhausting the Spirit of the Earth, makes it worse.

Of the first Sort are Turnips, and other Roots, and all the Pulse Kind, or Legums, which comprehend both, and which, by sheltering the Ground with their Leaves, retain the Nitre and Spirit of the Air, and thereby

thereby enrich it. Of the second Sort are Wheat, Bear, Rye and Oats, which are all of the graminous Kind, and Peelers of the Ground.

The Advantage that the Land reaps by Fallowing, is not solely that it has a Year's Rest; for no Body will deny, that if you plow down Clover early, or sow Pease, or other Grains, such as Buck-wheat, early, and plow them in, so as the Earth may have the Benefit of the Summer's Heat, to mellow and sweeten it, these will be better than if it had been at rest from any Crop, and perpetually turned over during the Time that these Crops were growing. The Benefit of Fallowing then is, that it cleans and pulverises the Land, and impregnates it with Juices, which are fit for the Production of Plants. Turnip is found to have the same Effects to a greater Degree; for if they take well, and be fed upon the Ground, they will, besides the Profit by the Cattle, be as beneficial to the Land as both Fallowing and Dunging.

This Account of the Effects of Fallowing is supported by the Experience of some Counties of *England*, who have not yet come into the Use of Turnip, and yet do not fallow the Ground, but by planting Pease or Beans in Lines by the Dibble, and hoeing twice in the Season betwixt the Rows, they cleanse the Land at the same Time that the Pease or Beans enrich it, and continue by this Means to sow their Grounds every Year, and are reckoned better Husbandmen than their Neighbours who fallow.

Altho', from what has been said, it will follow, That it is bad Husbandry to take two Crops of any of these robbing Grains successively; yet, if we consider the Husbandry of *Scotland*, as it is managed even by the most knowing, we shall find it is not conform to these Rules above-mentioned; for the best Husbandmen after a Fallow take a Crop of
Wheat,

Wheat, after the Wheat, Pease, then Barley, and then Oats, and after that they fallow again: Where they do not sow Wheat, they sow Barley after the Fallow, then Oats, then Pease, then Barley or Oats, and so go to Fallow again. In both which Methods they have two robbing Grains running, by which they so exhaust the Land, that the subsequent Fallowing is not able to recover it to a Vigour sufficient to produce Crops so good as they would be by another Method of Husbandry; and besides, the second Crop cannot be very good.

That the taking of two Crops of these Grains, which I call robbing Grains, running, beggars the Land, is in Part owned by all Countrymen; for they do not chuse to sow Bear after Bear, Wheat after Wheat, or to repeat Oats often: But they do not advert, that the sowing Bear after Wheat, which they often do, is of worse Consequence to the Ground than sowing Bear after Bear, because Wheat is a greater Peeler of the Ground than Bear; and the Notion of the Benefit had by changing the Grains, from the Conceit that different Grains feed upon different Juices, is vain; the Advantage arising from changing the Grains, being in substituting one that robs less, in place of one that robs more, or in putting a Top rooted, after a Horizontal rooted, and *vice versa*.

Of the Grains we sow, I think Wheat the greatest Robber of the Land, next Barley, then Oats; the Wheat requiring better Land than Barley, and Barley than Oats; and yet as Barley is sown after three Furs, and Oats after one, a Crop of Oats robs Ground more, because the Culture for Barley affords more Nourishment to feed upon. The Countrymen think they do no not harm their Land by the fourth Crop of Oats they take before their Fallow, but it is like setting up a lean Beast to feed.

I knew

I knew a Gentleman, who after Fallow had a fine Crop of Wheat, after which he had a good Crop of Bear; and that he might come the sooner to his great Crop of Wheat again, he took only a third Crop before his Fallow, which was Oats, then he fallowed and dunged as he usually did before; but he found the Wheat Crop but very indifferent; because though he had taken but three Crops they were all Robbers, which had wasted the Spirit of the Land, so as the Fallow could not recover it.

Before I leave this Head, I shall mention another Experiment, to prove, that graminous Plants are Peelers of Land, and that Legums enrich it. I know a Field which was sown with Rye Grass and Clover; but in sowing the Rye Grass, one Ridge happened to be missed: This Ridge, after the first Year, was better Grass than the rest; but the Field being plowed up, that Ridge, which was sown with Clover alone, was far better Corn than the rest, the Clover having enriched it, and the Rye Grass peel'd the other Part of the Field.

Seeing that the only Use of fallowing, is cleansing and mellowing the Land; that this may be obtained by Turnips, beside the Profit they bring otherwise; that it is evidently prejudicial to the Farmer, to sow two robbing Crops successively; and that our Neighbours in *England*, from whom we learned Fallowing, never take four Crops after a Fallow, as we do: We ought therefore to cleanse our Ground every fourth Year by Turnips, instead of Fallow, and to make Pease the Intermediate of the three following Crops.

If we cast up an Accompt of the Produce of ten Years by the present Method of fallowing, and sowing Wheat after the Fallow, and the Produce of ten Years in the Method now proposed, the Advantage will manifestly be on the Side of my Proposal.

Proposal. By the former, there will be in ten Years two Crops of Wheat, two of Bear, two of Oats, and two of Pease; by the latter, three Crops of Turnips, three of Bear, two of Pease, and two of Wheat; and if we go on to the next ten Years, there will be two Crops of Turnips, two of Bear, three of Pease, and three of Wheat; so the Difference betwixt the two Schemes, in the first ten Years, is, That in place of two Crops of Oats, there will be three Crops of Turnips, and one Crop of Bear; and, in the second ten Years, two Crops of Turnips, one of Pease, and one of Wheat, in place of these two Crops of Oats; but if we consider how much the Land will be enriched, and all the Crops vastly better, the Balance will lye greatly to this Side.

How far Turnips will thrive in this Country, how they will save Dung, and how this Dung is to be used, shall be explained afterwards.

If this Scheme take, it must please the Country-men in general, whom *Virgil* calls *Avarues*, or greedy of Gain, but especially these who cry out, *Who pays the Rent that Year in which the Land lies fallow*, and for Dung when they cannot get it? By sowing Turnips, they have a Crop every Year, and they can manure an Acre for a Sixpence.

Turnips for the Fields are of four Sorts, the flat, red, green, and the long Turnip, which the *French* call *Rave*: The flat red is hardier than the green, and lies more out of the Ground to be bit by the Cattle; the *Rave* is very hardy, and is said to enrich the Land most. They will all, if duly cultivated, grow large with us in the Fields in every Country of *Scotland*, from *Wick* in *Caithness*, to the *Mull* of *Galloway*. In *Galloway* they have been sown for several Years with great Success; and they must be very profitable for Winter Food, to the vast Numbers of Cattle they keep in that Grass Country, beside the Benefit they do to the Land: The Right Honourable *John* Earl of

Stair was the first that introduced the Turnip Husbandry, besides many other valuable Improvements, into our Country.

Altho' Turnips will thrive without Dung, in Land in tolerable Heart, and made as fine as is usual for Bear; yet, to make them do well at first, about the half of the Quantity commonly given to Fallow, may be necessary; but if a Drill plough be used, the Turnips will be fully as good a Crop without Dung, as in the common Way with it. By the Use of this Machine, Turnips will thrive in the stiffest Clays in this Country, where Fallowing hath formerly cleansed and mellowed them, so that this Husbandry of Turnips will answer to all Sorts of Soils where Corn is sown.

Altho' our Husbandmen are laborious, yet by having too much of their Farms in Tillage, and studying to sow too many different Grains, they are often disappointed of their Profits; for as they have generally almost their whole Farms in Tillage, they have not Time enough to manage any one Field or Grain, as it ought to be, because they must not neglect another, which they must likewise leave, to go to a third; so two well managed would be better than the three, and the third might be turned to another Use as good as any of them. This our Management gives Occasion to our Neighbours to say, That the *Scots* are at more Pains to be poor, than they take to be rich; and that they can make more Money (in right Management) with their Hands across, than we can do with all our Labour.

I do not mean by this, that our Husbandmen should lay aside the Plough, and turn all to Grass: For Grass hath not, as yet, turned to any great Account in this Country; tho' that hath only proceeded from the Land's not being laid down in good Order, either as to the Culture of the Ground, or Form of the Ridges; or sometimes from its being laid
down

down too soon after Alteration hath been made upon the Ridges; yet, as great Alterations are dangerous to those who will not make them properly, all I propose is, that as the Arable will be divided into four Divisions instead of five, as it is at present, the fifth may be added to the Grass Part of the Farm.

Upon this Head it is to be observed, That the Husbandry of any Country hath a great Dependence on the Manner of living of the Inhabitants: People do not live upon Wheat, Bear, Pease and Oats only, they would have good Beef and Mutton, Veal and Lamb, all the Year round, if they could. Our Forefathers, when the present Notion of Husbandry took Place, contented themselves with fresh Meat, when the Hills or Muirs could afford it, and lived on salt Meat and Poultry the rest of the Year: Now our Palates are more delicate.

By the Method of dividing the Land into four Parts, these who sow Wheat will have a notable Advantage, in abridging the Labour of the whole Year; for the Wheat being sown before Winter, they will have but two Grains to manage in the Spring, which will fall to be Pease and Barley: The Pease should be sown as early in *February* as the Season offers, and the Bear may very well be sown in *March*, when we commonly now begin to sow Oats: So the Bear-feed Sowing will be ended in *March*, or the Beginning of *April*, which at present is our ordinary Time of commencing it.

From thence to the Middle of *June*, there is Time enough, without Hurry, to prepare the Ground, and sow Turnips: From the Middle of *June* till Harvest, the Countryman will have little to do with his Servants, except Hay-making, and hoeing his Turnips; or with his Horses, except (if the Stones on the Ground, which are a great Hindrance to Husbandry, have been thrown to
the

the Sides or Ends of the Ridges of the Turnip Fields,) to carry them off to the Outsides of the Farm; for inclosing it.

If the Ground on the Outsides be stirred with the Plough, as often as there's Occasion, these Stones may be faced up, the Earth thrown to the Back of them, and Thorns planted before Winter; by which Means, all the Farm may by Degrees be inclosed. These who sow all their three Crops in the Spring, will have the more Time to manage them, that they have thrown out a Fifth of their Arable.

The sowing of Turnips will also abridge the Labour in Winter; for Barley may be sown on once Plowing, but if the Land be plowed up, after the Turnips are off in *January*, into narrow Ridges of four Furs, and ly so till Spring, when it may be plowed as broad as you please, this will mellow and enrich the Ground wonderfully.

Tho' this Scheme of Husbandry will appear rational to many, yet some will object, That the Season proposed is too early for sowing Bear; That the Wheat will not be so good after the Pease as after the Fallow; and, That it will be a Loss to the Farmer, who sows Wheat, to want Oats.

To the First it is answered, That where the Land is clean and rich, which it will be after the Turnips, 'tis better to sow Bear in *March*, than later; After Turnips there will be neither Grass Roots nor many Annuals in the Ground; and when any Grain is sown on dry and rich Land, the Injuries of the Weather need not be feared. This the Husbandmen are not ignorant of, for in *March* they chuse to sow Barley on new lim'd Land; and at that Season they sow a late Sort of Barley, well enough known amongst them. The sowing of this Kind will answer another Objection, which is,
That

That early sown Corn is subject to be destroyed by Crows, and other Birds.

As to the second Objection, besides what has been formerly asserted, That the Turnips and Pease will bring the Land into far better Heart than it can be by the present Management: 'Tis to be remarked, that by sowing the Pease early, they will come sooner off the Ground than by our present Method; besides, the *English* have two or three Sorts of grey Pease, called, the *Beaudye* Pea, the *Paplin* Pea, and the *Marlborough* Grey, which are as hardy as any we use, and are cut down early enough to prepare the Land, and sow the Wheat as soon as we could desire.

The third Objection is not worth answering; for, he who hath Money will do better to buy Oats of his Neighbours, who don't sow Wheat, than beggar himself and his Ground, for the sake of an old Custom. But as a few Oats, mixed with Pease or Beans, may serve his Horses, he and his Servants will suffer no great Hardship tho' reduced to the Necessity of eating Wheat-bread.

Besides these Sorts of Pease, they use a Grain in some Counties of *England*, called *Winter Vetches*, by sowing which, they make a considerable Improvement upon the Scheme of Husbandry now proposed: For, after the third Crop from the Turnips, they plow and sow them in the Month of *September*: They are hardier than Wheat, and thriving all the Winter when the Weather is fresh, they feed Sheep or black Cattle with them in the Spring, or cut them down early enough to sow Turnips thereafter. Which serves for Dung to their Turnips in their poorest Land.

In their richer Grounds they sow any of the Sorts of Pease formerly mentioned, early in the Spring, after their last Crop, and have them off before the Time for sowing Turnips is over.

ver. Sometimes they sow Clover with their last Crop, and after taking one Crop of it, plow it down, and sow Turnips.

The first Method will answer very well with us; for, as the Time of cutting the Winter Vetches, is with them the End of *May*, they will be ready for it here before the Middle of *June*; and tho' somewhat later, it will be in Time enough for sowing Turnips by the Drill plough, for they may be sown later that Way than out of Hand.

We can't propose to have a right Crop of the other Pease here in Time, to have Turnips from the Seed after them; but if we sow Turnip-seed early in good Ground, they may be pulled when about the Bigness of young Radishes, and planted after the Plough when the Pease come off, and be as good as if sown three Weeks or a Month sooner. By this Method, the Husbandman hath two Crops in place of a Fallow. And Turnips may be planted after the Plough in Lint Land to the same Advantage.

The greatest Objection that can be brought against this Plan, is the want of Inclosures. But, as an easy Method for accomplishing this has been already hinted at, if the Profit, shown to arise from this Scheme, should encourage Husbandmen to inclose their Grounds, our whole People might be happy. Several Gentlemen have inclosed Grounds; some Countrymen in the Southern Shires have their Farms inclosed; and many sow Wheat and get it preserved, why not Turnips? We have a Law for Winter Herding.

I know a Man, who, in Run-ridge Land, sowed a Ridge with Clover and Rye-grass, several Years ago, which, at this Day, continues to be better Grass than any inclosed Land in the Country; for, when the Corn was carried off the Ground, the Greenness and Sweetness of these Grasses attracted
all

all the neighbouring Beasts, and when Corn was again sown it was saved, and the Land was enriched by the Dung of them.

This is a cunning Fellow; for Dung is stolen: The Theft can be proved, but it is not punishable.

The Dung which is saved by sowing of Turnips, even in the common Way, which, at first, will be the one Half, and, after the Improvement has taken Place for some Time, will be the whole, may be laid to far greater Advantage upon Grass than on Corn Land, where it is apt to breed Weeds, and is thought to encourage Straw more than Grain. The dunging of Grass makes it spring all Winter, when Grass is most valuable, increases the Quantity, and makes it richer. This we observe in old Pastures, Town Greens, and Places where Sheep have lien. The perpetual Verdour does not proceed from the Age of the Grass, as People commonly imagine, but from the Dung which in these Places abounds. The same will happen to Grounds well dung'd, tho' lately laid down.

If the fifth of the Arable, together with what was allowed for Grass formerly, which I shall suppose to be a sixth Part of the Farm, be managed in this Method, it will be fit to feed Ewes and early Lambs, or Wedders, or Milk-cows, and bring as much Benefit to the Master as any other Part of the Farm; and these two Sixths, which make one Third, being changed about in a regular Course with the rest, may be a great Advantage to the whole Farm.

This Grass, together with the Benefit which will be got by the Turnips, will enable the Farmer to keep a considerable Number of Beasts in good Order, by which Means he will be capable to pay a good Part of his Rent, and not be obliged to depend on Corn alone. If the Husbandry used in *Flanders*, of planting Turnips by the Plough after
any

any Crop, (which gives them two Crops in the Year on all their Land) were followed, it would be a great Help to the maintaining the Beasts in the Spring, beside the Benefit it would bring to the Land; for tho' these Turnips which are planted in the End of *August*, or Beginning of *September*, will not come to the Size of Summer Turnips, they will stand better to the Spring than the other, and be of great Use to the Cattle when the others are gone.

Upon this Head, it would not be amiss, if the Countryman had Time for it, to plant Rape, where the Ground is good, in the Beginning of *September*, after any Corn Crop, which the *Flemish* find to do better so planted, than if sown out of Hand on a Fallow. If the Rape be not good enough to stand for a Crop, the Benefit Cattle will get by eating it in the Spring will pay for all the Charge. These Things will keep the Cattle in fine Order. Rye-grass, tho' a great Robber of the Land, will, if dung'd, be of notable Use in this Way, for it comes early, and lasts long in the Ground.

There are several other Ways of bringing Profit by Husbandry, such as planting several Things in the Field, now only brought up in the Garden, and saving their Seeds; propagating the Plants used by Dyers, which are no greater Strangers to our Fields, than Wheat and Barley once were. But, as these Improvements will be easily attained to, being only the Consequence of sowing Turnips, which, by enriching our Land, will not only increase our Grain, improve our Fleshes, give Milk, Butter, and Cheese, to these who live upon Bread and Water, but even save our Money paid for foreign Articles, find Subjects to employ our People, and keep them at Home to consume our Grain; I shall not insist upon them.

Tho'

Tho' what is contained in these Sheets may seem new, and to strike at the two strong Pillars of our present Husbandry; yet it ought to be remembered, that a Pamphlet of two or three Sheets on the Husbandry of *Flanders*, sent over by Sir *Richard Weston*, who was banished for his Loyalty, hath benefited *England* many Millions, as may be seen in the large Transactions of the Royal Society.

To shew how far the Improvement of Land may be carried, I shall subjoin three Paragraphs of an Essay, published in *England* in *January 1717*. The Words are, " But it is easy to furnish at once what-
 " ever Quantity can possibly be wanted of the
 " Leaf most proper for the Business, and that by
 " a yearly and regular Crop from the first Year on-
 " ward, or in less Time, and with much less Ex-
 " pence than we reap Wheat or Barley. The Me-
 " thod is easy and plain, as has been often practi-
 " sed in *Europe*, tho' it was brought us from *China*.
 " 'Tis no more than this. When Mulberries are
 " ripe, they bruise them with their Hands, and
 " washing off the Pulp from the Seed, abounding
 " in that Berry, either in Autumn, or waiting till
 " the Spring, they sow it in Drills, or small Tren-
 " ches, which they make with a Hoe, as our
 " Gardiners sow Pease, and in two or three Months
 " they will shoot up a thick twiggy Forest, about
 " a Foot high, and abounding with Leaves, far
 " more smooth, sweet and tender, and fitter for
 " the Silk-worm, than those which are gathered
 " from old full grown Mulberry-trees.
 " These small Twigs they mow or reap down
 " with a Sickle, and stripping off the Leaves for the
 " Food of their Worms, before they have got to
 " the Extent of their Ground-plot, the Place they
 " began at is furnished again with a new Shoot, as
 " fine as the former, and so the same Roots will
 " continue for ever to shoot out small Twigs which
 Y y
 are

“ are thick set with Leaves, above fourteen Days
 “ earlier in the Spring than they can be gathered
 “ from the Trees in our Gardens.”

This Project appears the more feasible from a late Experiment made by Mr. *Heron* of *Bargally*, upon the Bastard Cinna, a woody Shrub, which, by continual Mowing, he converts into a Forage, and from the Practice of the *Romans*, of making a Forage in the same Way of the *Cytisus*, which is also a hard woody Plant.

The ingenious Gentleman who wrote the immediate preceeding Essay, was pleased to ask my Opinion of it : The Alterations thought proper were made by us, and it was published in the Year 1732. It has been long out of Print, and being, in my Opinion, well deserving of a Republication, I have thought proper to give it a Place here, after revising and reforming it.

Memorial for William Taylor Esq; of E-trickhall, Writer in Edinburgh.

THE Plan I have made, and herewith offer you of my Survey of your late Purchase of *Etrickhall*, shows the Number of Acres in the whole of it, and in its several Parts, as I have distinguished them.

I consider these Lands to be of far more Value than they have been esteemed, and worth more Rent than they have paid, or indeed can be expected for them, until the Management is altered, and some Improvements, which cannot come to any great Expence, are wrought.

To show which, I shall, *first*, speak of the several Parts of these Lands; next, of the Mismanagements of them; then of the Improvements that, I think, would

would make them far more valuable. *Lastly*, I shall mention the Rent, I think, they might then pay, and give Reasons for what I shall alledge as I go on.

The Mountains, generally green and bearing good Grass, have the Advantage of Peat-earth and Heath in them: This qualifies them to be the fitter for Hogs, [Sheep in the first Year of their Age] and for this Ground the Store-master generally pays, and can afford to pay as dear as for any other Pasture Land; for Hogs, when they live and thrive, are, at least, as profitable as any other Part of his Stock.

The Remainder of the Ground is Haughs, or Meadow-land: The Haughs are generally a rich Loam; the rest of them is a quick and lively lighter Soil, equally qualified for Corn or Grass: The upper Stratum of the far greatest Part of the Meadow, of about thirty Acres Extent, is a rich Loam; the Remainder of it is mossy, and the next Stratum of the whole, or the greatest Part of the whole of it, is a Marle, or, at least, an exceeding rich marly Clay for a great Depth.

This I showed to several Persons, having made Trials, by boring with an Instrument; but the Face of the Marle is to be seen by walking on the River-side: This Description of your Fields and Soils I can support to be just, and shall afterwards show, how ignorant, or slothful, or both, the Farmers have been, who never used the Marle.

The Account of the Mismanagements comes next in the Order of my Proceeding before laid down: This, I fear, will not be very pleasing to you; but I must lay Sores open, before I can properly apply Remedies. Your Mountains, and all the Mountains in that Neighbourhood, have been look'd upon as fittest for the pasturing of Sheep; but your Lands having also a great Extent of good arable

arable Ground and Meadow, a mixed Stock of Horses, Cows, and Sheep, was kept on them, and the two first not having been restrained from the Pasture of the last, and the last having been allowed to come down and eat the fat and tender Grass of the plowed Ground, they neither did nor could stand: The Grass among the Stubble, but especially the Grass arising from the Dung of Horses and Black-Cattle, was Poison to them; so many of them died, and the Farms were thought unwholesome, only because the Farmers were ignorant or slothful.

This was bad, but worse comes next, as more difficult to redress; for the arable Ground, and Meadow, were to a good Manager, worth a greater Rent, without the Mountains, than they paid, or could, according to their Management, pay for the whole. Here a reasonable Question arises, What did they do? The very worst Things they could. They have allowed the Water of *Etrick* to carry away very much of as good Haugh-ground as is in that Country, or almost in *Scotland*, and the Remainder they have plowed without Discretion, and done their utmost to impoverish it by robbing Crops: They have allowed *Midship-burn* to damnify the Meadow, and Saughs to grow over many Acres of it to such a Degree, that until they are removed, it must remain useless. An unhappy Condition, if there was no Remedy! But I hope I shall show evidently, that Prudence, with Diligence, and a very moderate Sum expended, may give Relief from all the bad Effects of their Ignorance, or Slothfulness and Mismanagement; that the Character of your Grounds may be yet made good and exalted, and that you have a very profitable Purchase, Matters, even as they stand, being well conducted.

To remedy these Evils, Care should be taken that neither Horses or Black-Cattle be allowed to feed on the Mountains, because by the noxious Quality of the Grass, so occasioned, the Farmers have yearly lost great Numbers of their Sheep, the tender Race; so the Pasture hath groundlessly been reputed unwholesome, your Authors have suffered, and you do suffer by that gross Mismanagement, the Rent being kept low, and in Danger of falling lower.

As the Mountains are high, Provision for Food, and Stells for Shelter, in the evil Days and stormy Nights, should be made: The Stell Dykes should not be of Turf cut from the very Sides of their Bottoms; for the Sheep soon make Puddles when the Surface is there broke, but of high Walls of Stone, to be found at Hand; and good Hay should be ready to give them on all necessary Occasions.

The Hay would be Physick as well as Food for them, by drying up watery Humours which cause the Rot and their Death: The Stells, if planted full of Firs, would keep them warm and safe, and the Dykes, they lying by the Sides of them, would shelter them in the meantime, until the Firs grow up to be out of any Danger of being hurt by them.

One of these Stells, for *Wester Etrick*, might be made near the Foot of *Turners-cleugh*; another near the Herdsman's House, and a third betwixt them, and near to the Vestige of a Dyke which hath been built for a Stell, with Turf, when Stones were for the lifting.

There is in *Wester Etrick* about ten Acres of Haugh Ground: This Field having the Water on the one Side, if it was separated from the Hill on the other by a good Stone Dyke, and divided into Halves, for all which Stones may be easily got, these Halves might be in Corn and Rye-grass alternately, which

which would afford a sufficient Quantity of this Hay, which is the best for the Purpose for which it is wanted, and Corn is more valuable among Mountains than in a low Country: The Sheep eating the Hay would be physically fed, and they, lying in the Inclosures, would make and keep them rich for ever by their Dung: This Conduct would surely make *Wester Etrick* more valuable than it hath hitherto been.

Stells should also be made, in Manner forefaid, in convenient Places of the Mountain of *Easter Etrick*, and a Wall, sufficient to defend against Sheep; along the Side of the Road leading from *Midship* to *Etrick Kirk*: This Wall would serve several good Purposes; it would so far inclose the Mountain; it, with the Assistance of *Etrick Water*, and *Midship Burn*, when cast, would totally inclose the Meadow, with a small Piece of the Mountain into it, and this Part of the Mountain will make an useful Inclosure, if a Ditch is cast betwixt it and the Meadow, which will be found necessary for draining the Meadow fully.

To improve the Meadow, which is capable of a very high Improvement, the first Thing to be done, and a Thing which is indispensable, is to cast a Course for *Midship Burn* so wide, and so deep, that it may be fully able to contain all the Water that, by the Overflow, does now vast Damage: Then, to clean the Ditch already made through the Meadow: The Effects of these will show what more Ditches are necessary for the Draining of it.

When it is drained, and the Saughs are rooted out, good Steps will be made towards the Improvement, but more will be necessary to compleat it in the most effectual Manner; for 'tis stocked with Grass of bad Kinds, and with Weeds, which the Water fitted the Earth to produce and nourish; and its Surface, at least where the Saughs grow, is unequal,

qual, and will become more so by hoeing them out; for these Reasons, the best Conduct will be, to plow the Ground two or three Years for Corn.

If it is well drained and plowed, it must yield great Crops: When the Mould is made fine, and the Surface even, sow Clover and Rye-grass with the Corn, and it must produce a vast Load of Grass: This Management is for the Parts that are not Mofs: These which are, must be pared and burnt, and then they should be used as the rest of it: This very large Meadow, thus managed, must make an excellent Field for Corn, or for Grass for Hay, or for Pasture, though there was no Marle in it, of which I shall speak hereafter.

Before I pass over the Water, I must stop a while, to consider the Damage it has done, and endeavour to show how to prevent its doing more: I believe it had not done near so much if it had been allowed to keep its natural Course; but one of your Authors diverting it, and not making a new Channel sufficiently wide and deep, it has taken unlucky Turns, sweep'd away much excellent Land, and will yearly carry off more, if it is not prevented by some prudent Method: What that is, and how to follow it furth, in the most frugal and effectual Manner, is a needful Question.

The Reason why it has done such Mischief is, surely, because it found the Channel insufficient to contain it: Wherefore I must think that the enlarging of its Channel sufficiently, in the Place where it can do the least Hurt, is the Way to get it most and best commanded; and it is lucky for you that this is the Place where you can most safely and easily make the Channel of it larger.

I have no Notion that it is practicable, at any moderate Expence, to stop, by the Means of Stones, its taking its own Courses, except at the very Head of your Haugh. At that Place, indeed, there

there are more Stones than can be needful, and there it must be forced into its Southmost Current, which must be widened and deepened to receive it all; but this is not the Place to begin the absolutely necessary Work of preserving your Haughs.

It should be begun at the Foot of the Meadow, by widening and deepening the Channel, and diverting it from the Meadow-side, which is suffering by it; but, from the Meadow-head and upwards, lead it as much to the South as possible, for this plain Reason, that the Mountain will defend itself, and so there will be no more needful for the Completion of the Work but the making of the Channel wide and deep enough, and deepest on the Side nearest to the Mountain, that the Weight of the Water may ly there, where there is an invincible Barrier.

Lucky it is that this can be effectually and yet cheap done; for you have, to appearance, no Rocks to wrestle with, the whole Channel being Earth with a Mixture of Sand or Pebbles, rarely Stones bigger than the last; wherefore, loosen the Bottom of the Channel in the Time of a Drought, and the Force of the Water, which runs with great Rapidity, will, when a Flood comes, carry off the Earth, Sand, and smaller Pebbles, and then no more will remain to be done, except only to throw out the biggest, and therewith to strengthen the weakest Parts of the Bank: Once, or even twice doing may not be sufficient, but yet it must be an easy Work to do so much Good.

Now, I think, I have come regularly on to consider your large Haugh of 79 Acres. Tho' it be defended from the Water, yet it will greatly need to be secured, on the other Side, from Trespasses by Lord *Napier's* Tenants Cattle: Their Sheep especially have always fallen, and must still fall
down

own and trespass upon it, lying at the very Foot of their Mountains, until prevented, which can be no other way done, but by an invincible Fence betwixt his Lordship's Ground and yours, which would greatly tend to your mutual Advantage, for both Grounds would be so far inclosed, and so far the Cattle of both would have the Benefit of Shelter, which would be of the greater Value to Lord *Napier's* Tenant, that his Lordship's Ground lies exceedingly exposed on this Side.

More Stones are easily to be got, than would be sufficient for building a Wall on the present March; but, as you will observe from the Plan, it is so crooked, that it will be for your mutual Advantage to straighten it by giving and taking Ground. His Lordship, you know, could, by Law, be obliged to straighten the March, and be at the Half of the Expence of the Dyke, but he will, no doubt, see his own Interest and concur willingly.

These Things being done, mark out this large and valuable Haugh into three Parts of an equal Number of Acres; plow as much of one of the Thirds for Oats as may be thought in condition to give two profitable Crops, and the rest of it for a Summer Fallow; give it many Plowings, for in the Number and Seasonableness of them the Value of the Fallow consists. Second Year, plow the whole of this Third for a Crop of Oats or Barley, and therewith sow the Seeds of Clover and Rye-grass. Third Year, plow the whole of another Third for Oats or Fallow as aforesaid, and cut the Clover and Rye-grass for Hay or House-feeding. Fourth Year, plow this Third for a Crop of Oats or Barley, sow the Seeds of Clover and Rye-grass therewith, and cut the first sowed Clover and Rye-grass as aforesaid. Fifth Year, plow the last Third for Oats or Barley as before mentioned, cut the last sowed Clover and Rye-grass, and pasture

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the first sowed. Sixth Year, plow this last Third for Oats or Barley, sow Clover and Rye-grass therewith, cut the immediately before sowed Clover and Rye-grass, and pasture the first sowed. Seventh Year, plow the first Third for Oats, cut the last sowed Clover and Rye-grass, pasture the other Third; and so, going on in the Order aforesaid, one Third of the Field will always be in Corn, another Third in Grass for cutting, and the last Third for Pasture.

This Management, and the proper using of the Dung that will be made by the Home Consumption of the Fruits of the Ground, will, I think I may reasonably say, soon make the Corn that will grow on one Third as valuable as all the Corn that, according to the former Management, before taken Notice of, grew on the whole.

The Advantages of this Plan of Husbandry are so obvious, and so greatly preferable to the former Method, by which the Strength and Spirit of the Ground was exhausted, that I shall not needlessly take up your Time representing them.

I once, indeed, thought of proposing three Crops of Grain before the sowing of Grass-seeds; in that Case, of directing Pease, or Beans, for the second Crop, and then of continuing the Ground, always after the three Grain Crops, six Years in Grass; but doubting if Pease or Beans would prove a certain good Crop so far in among the Mountains, and being almost certain that no Farmer would chuse to have no other Crop of Grain, except the one or the other of them every third Year, I found a Necessity to advise the Plan I have offered, of sowing white Grain twice successively, which I shall never recommend unless I find some extraordinary Cause for it, as in the present Case.

I shall now take your Marle or marly Clay more fully under Consideration. Throw it out, let it
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ly to dry, and it will become lighter; then carry it to your lightest Soil when in Pasture, spread it carefully, if needful repeat the Spreading, then let it ly for one Year at least, and it will gather Riches from the Atmosphere, which it is barred from, when it is plowed down before it be allowed to ly exposed; a Practice too common: While it lies on the Surface the Grass will be benefited by it: After plowing, every Soil is improved by the Mixture of a contrary; but a light Soil is the more enriched, the more the Earth applied is of the Nature of a Clay Marle.

In regard you may grudge the Expence of carrying your Clay to any considerable Distance, and as it is not so proper a Manure for strong Soils as for light, I advise, first, as there is Moss of a considerable Depth in your Meadow, to superinduce the Earth that will be thrown out of the Ditches, by the draining of it, upon the Moss; spread it, pare the Moss, burn it with the Earth superinduced in large Heaps, and apply the Ashes where there may be most Occasion for Manure: Their extraordinary fertilizing Quality for Corn or for Grass is well known.

After the Earth thrown out of the Ditches is spent, import upon the Moss any other Earth that can be best spared, or rather your marly Clay; then spread, pare, and burn as aforesaid, and so you may go on as often as you have Occasion for Manure, while your Moss, which will not be soon consumed, lasts: Thus, you see, by Ashes you can supply the Want of Lime, which you cannot get at any moderate Distance to buy, and can make and keep your Ground as rich as you please without it; for tho' the Moss in the Meadow may be consumed, it is inexhaustible on the Hills, and Ashes are a very light Carriage.

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Moreover, I do not know but you may get more Lime in your own Ground than is sufficient for the County. Some Authors aver, that Slate will burn into Lime; and, if it will burn with Peats, then you may have as great Quantities of it as you please for the Uses of your Ground, or for Sale, as I believe your Slate Rocks and your Mosses will never be totally consumed until the Consummation of all Things.

I can say nothing to this from Experience or Observation, but I think you are reasonably called to make repeated Trials; for though you can do very well without it for your own Ground, it would be very valuable for Sale, no Lime-stone Quarry being yet found within a great Distance, and much Ground lying uncultivated for Want of Lime.

If it shall be asked, What can be done with so much Hay as is proposed, in a Place where it cannot be sold? I answer, Beasts will eat it: They can be sold: Good Clover and Rye-grass Hay is worth $2\frac{1}{2}$ or 3 *d.* per Stone, even for Stall-feeding at *Etrick-hall*, and the Dung of the Cattle is well worth the Expence of the Feeder.

All I have proposed being fully executed, and the Management of the Lands being carried on according to the Plan I have offered, I make no Scruple to say, that a Farmer might better afford to pay 100 *l. Sterling*, than the former Tenants could the lowest Rent they have paid at any Time for forty Years past; and I am pretty well satisfied that the Expence concerning the Waters, the Draining and the Dykes, Lord *Napier* concurring where his Lordship's Lands march with yours, could not well exceed 50 *l.* if so much, Matters being prudently managed: Would it not be well laid out Money?

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To give a View that a Tenant could, in the Event foreaid, pay so much as I have mentioned, I shall observe, that there is more than 100 Acres of good arable Land and Meadow. Is not every Acre of either of them, if improved and managed as I have proposed, well worth ten Shillings of yearly Rent? Here is more than 50 Pounds of the 100.

Every Man with whom I have spoke concerning the stocking of your Mountains, confessed that they would, at least, keep thirty Scores of Sheep, and the Herdsman's; and that Storemasters in that Country generally pay of Rent two Shillings for the Grass of every Sheep they can keep well. This is neat 60 Pounds. Would not then your whole Lands of *Etrick-hall* be cheap rented to one good Tenant at the 100 Pounds? and will not you have made a very profitable Purchase of your Freehold Estate, with a good House on it?

I hope you will allow that all I have said is reasonable; but probably you may say, How can I, who have so much Writer Business, get such Things, and so many of them done? The only Answer I here give is this: It was my Duty to show you what must be profitable to you when done: To find out the Means should be your Business; but even this I shall point at in Conversation, to which, as the Paper is swelled, I defer it.

Memorial for *concerning the*
Regulation and Improvement of a great Estate.

HAVING the Honour to be called, to give my Opinion concerning the Regulation and Improvement of your Estate, I beg your Patience

tience till I show, 1st, That your Grounds are wasted, and your Tenants kept poor, by the shameful and hurtful Management of their Farms, which, while continued, must still have a worse and a worse Effect, as the Land, and so they themselves must grow poorer and poorer: And, 2^{dly}, Until I point out, and inforce, by the best Reasons that may occur to me, a Method of Husbandry plain, easy, and very moderately expensive; by which, if exactly followed furth, your Lands must grow better and better, your Tenants richer and richer, your Rents rise, and be better paid.

To show how much your great Estate, even in this Part of the Country, wants Regulation and Improvement, and, as I am informed, the other Parts of it are equally ill managed, I shall presume to offer such a Representation or History, as I cannot doubt, will satisfy you fully, that such unaccountable Husbandry and Ways must necessarily have produced the bad Effects too apparent, and that, if the Soil had not been exceedingly good, must have reduced it to a State of Sterility.

There is a general, and, I believe, a just Complaint among the Landlords in this District of the County, that their Rents are ill paid, which would dispose a Stranger to think, that the Lands are either very bad, or too high rented: But, so far as I have travelled through the Country, conversed upon that Subject, and observed the Soil, I cannot attribute the bad Payment of the Rents to either of these Causes; but to the Unskilfulness and Laziness of the Farmers, their Tenaciousness to detestable Customs, and a settled Hatred to all Improvements and Improvers, which makes them indocile, and keeps them in Ignorance and Poverty.

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The Soil is generally good ; for it is neither a stubborn Clay, nor an open Sand, but an equal Mixture of both, and seems to want nothing but proper Culture, and judicious Management, to make it bear any Crop that *Scots* Ground will produce ; especially, as I observe, that there is no Want of proper Materials for Manure, Limestone and Coals being to be had at easy Rates, and short Carriages, and the best Sort of Moss, [Peat Earth] almost in every Farm, which mixed with Lime, Earth, and Dung, makes one of the best compounded Manures for such Lands ; so it must look strange to all who have right Notions of Husbandry, that ever, except by the Rigour of extraordinary Seasons, there should be the least Scarcity in such a Country : But this Wonder ceases, when one comes to know the Humour and Genius of the Farmers, and their Ignorance, Laziness, and Poverty which occasion it ; but what better can be expected of them, if the Ways they are allowed to go on in are considered ?

The Boys and Girls, so soon as they are able, go all Summer to the herding, and the poorer Sort of them, whose Parents have no Farms, go a begging all Winter : Thus they go on, till by Degrees a Boy comes to be able to drive a Plow, or rather to lead the two foremost Horses.

Here I must throw in a Remark : Their Land is easily plowed, and yet a Plough must have three Persons at it ; one of them with a long Pole, by which he guides the Plough at the Muzzle, and at the same Time drives the Horses ; for this *needful* Servant I beg Leave to observe, that at the Plow he gets no Time to eat the Bread of Idleness ; for he's there the hardest wrought Man on the Farm, and manages the well contrived Instrument with such a Dexterity, as must highly amuse Strangers as they pass by !

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When the Boy has led the two foremost Horses for some Seasons, and comes to have Ability and Dexterity to manage this Pole, he works with it, till he thinks he can command the Stilts, and then he commences a Plowman.

When he can plow in the unskilful Way of his Neighbours, and perhaps sow, he asks a great Wage, of which he is often ill deserving; but if by that Means he saves a hundred Merks (5 *l.* 11 *s.* 1 $\frac{1}{3}$ *d.*) or two, then to the Fairs and Markets he goes, a Dealer he becomes, he coups [exchanges] a Horse, buys and sells a Cow; he courts; he kisses, and dances with the Lasses, who expect him there in their best Dress, and will not be absent, tho' the Wind should shake, or the Rain rot their Parents or their Masters Corn.

Well, a Wife he gets: If her Father had Land, tho' ever so little, it is ten to one if she has any Thing but the Cloaths on her Back; for please know, that it is reckoned a great Scandal for a Man in that Situation of Life, to let his Children go to Service: But, if she is not of this gentle Kind, has been at Service, and hath been saving, which few of them are, bestowing all on Dress, perhaps she may have got fifty or a hundred Merks scraped together; but in any Event, a Mailing they must have, a Horse-gang or two of Land, or, as some of them express it, a Leg or two of a Plow; for, as Service was a Scandal before Marriage, much more is it reputed so in that honourable State, to People having a Stock: This is their own Way of speaking.

Now they have got together, and got a Farm; but let us see how they and theirs can live upon it, if the Rent is paid: This would require a quick Sight indeed, for such a Farm must produce from its own natural, tho' formerly much exhausted Strength, seeing it cannot be reasonably expected, that such

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a Tenant has Money to bestow upon it; so from such a small Beginning, little Understanding, and no well founded Experience, nothing that's good is to be expected: The Custom or Practice of the Country is all the Rule he has to follow, and all Soils get the same Management: If they do not produce well with it, they are doomed barren and unfruitful, and must be lowered in their Rents, or lye waste: But if the customary Labour be considered, it is no Wonder to see bad Crops. The Practice which is general is this:

A Farm is divided into what is called *Croft* and *Field Lands*, and these are sub-divided into *Falls*: The *Croft Land* into four *Falls*, and the *Field Land* into two: The *Croft Land* is plowed three Years for so many Crops, and rests one: The *Field Land* is plowed three Years, and lies three. The Fall of *Croft Land*, after it has rested its Year, gets what Dung from Cattle the Farm affords, and then Bear is made from that new Ley, with only two bad Plowings, and sometimes but one; the first not until about *April*.

The *Field Land* gets neither Dung, Lime, or Taithing, either when it is lying or going, and must give three Crops of Oats, though some of them will scarcely return the Seed, and so *Croft* and *Field Lands* must go their Rounds, and have done so for Time immemorial, without any material Alteration, except in a very few Instances.

Some have indeed ventured to lay out a little Money, or rather to bestow a little uncommon Labour, to put Lime into their Dunghills, and some have even gone the Length to lay a small Quantity of Lime on their *Field Land*, tho' very small in Proportion to the Extent of the Ground they applied it to; but as it could only have a very small Effect, on a Soil so robbed and worn out, unless it had been quickened by Dung, or at

least by the Interjection of meliorating among deteriorating Crops, it is unreasonably concluded, that Lime will do no good on the Outfield Land: From all which it may reasonably be observed, that their Husbandry is stupidly foolish, as well as prejudicial, especially since they do not alter their Method in any Season; for they always plow and sow at one Time of the Year, and have no Rule to direct them: They go on blindly after a blind Guide; one begins when his Neighbour begins, and the Example-giver is commonly one who has scraped a little Pelf together, seldom by Husbandry, that being scarcely possible in their Way of labouring, but in some other Way, or by the Favour of Fortune; and his Skill is generally judged by his Riches: He's the leading Man, and he's followed; and if any Man should pretend to differ from their Ways, the Cry is against him for a light-headed Innovator, and for a foolish Pretender to more Knowledge than his Forefathers had; all Tongues are set loose to backbite him at the Market Meetings, and to break his Credit. If we allow him to go on, *say they*, he will show that our Farms are improveable, and then our Rents will be raised.

If a Stranger comes among them, they attempt, by open Force, or secret Fraud, to intimidate him, or steal away his good Reputation, or both: By these detestable Practices, they monopolize the whole Country into their own Hands, and at length, by a Corruption of the Meaning of Words, they call themselves *kindly Tenants*: Whereas, in Reality, they are Masters of such as are only nominally their Masters, for a Landlord cannot, at least he rarely can set a Farm, unless the present Possessor not only give his Consent, but Benediction, which they will by no Means give to a Stranger; and every Man by them is reckoned such, who has not
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been born, and bred up in the Barony wherein they live : He, the Stranger, is branded with the Name of *Land-louper*, or worse : There is a general Concurrence to disappoint all his Designs : He is threatened and intimidated, as I have said.

I could mention the Farm, from which, as I have been informed by a Gentleman of Honour, one Stranger, who was improving it, was frightened out of the Country ; another got a Stack of Clover and Rye-grass Hay burnt, and, no Doubt, more such Instances might be given. A bad State of a Country ! A bad State of Landlords this ! and I see no Reason why I may not say, a bad Condition of the Farmers themselves ; for they generally live poorly, because nothing but Compulsion, neither the Difference of Soils nor of Seasons, will make them alter their Method.

If God is not pleased to keep the Season for their Time, they will not take it at his, and so they lose their Share of the Promise of a Seed-time, and a Harvest, for there are no Days or Weeks fixed for either of them, and their late Sowing is the Cause of their late Reaping, and of their ill-filled, and often rotten Corn.

Tho' the Weather prove ever so favourable, they will not plow till their own Time, about *Candle-mas*, come ; but then, be the Weather foul or fair, they go on, thro' thick and thin, wet and dry, Frost and Snow, destroying their Horses, tho' they feed them extravagantly ; by which Management the Ground is destroyed, their Masters must ly out of their Rents, and often lose them ; for they will pay the Country People, and put Things into their Neighbours Hands, who will keep them from their Master's Knowledge : It is a settled Principle among them, and, as I am informed, defended by Pretenders to Religion, that 'tis no Crime to take
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an Advantage of their Masters ; they want it, and their Masters can spare it, say they.

Heterodox Principle of an unaccountable Set of ignorant, obstinate, and lazy People! I say lazy, for, except in the Times of their plowing, sowing, and the Harvest, they do little or nothing in their Farms, besides casting, winning, and leading some Peats to burn with Coals, pulling some Thistles, or making some Hay, and threshing Fodder for their Beasts.

There is a Necessity that you insist upon their becoming bound to pursue better Husbandry; Husbandry by which they would live more happily, your Rents be better paid, and your Lands, in the Course of a few Years, become able to bear far greater Rents: Will you suffer them to possess your Grounds at three or four Shillings the Acre, and be still making them worse? Grounds which would give fifteen or twenty Shillings *per* Acre in other Countries of *Scotland*, equally distant from Places of Consumpt, and where Grain sells no dearer, but almost constantly cheaper.

Thus, I have endeavoured to prove my first Allegation, That your Grounds are wasted, and your Tenants kept poor to a high Degree, by their shameful and destructive Husbandry, which, while continued, must still have a worse, and a worse Effect, as the Land must grow poorer and poorer. I do not, indeed, pretend that all the Facts represented as aforesaid consist with my own Knowledge, being a Stranger in the Country until of late; but of them I have been informed by several Persons of such Characters and Reputations, that I cannot doubt the least Article of them.

Now, I come to point out, and enforce by the best Arguments that may occur to me, a Method of Husbandry, plain, easy, and very moderately expensive, by which, if exactly followed furth,
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your Lands must grow better and better, your Tenants richer and richer, your Rents rise, and be better paid: But I am afraid, when I consider the Set that is to do with, and their detestable Ways aforementioned, Persuasion will not, singly, be effectual to induce them to leave their present Method of Husbandry, for the best Plan of it that any Man can devise; yea, methinks, I am sure of it; and therefore I am equally certain that you will find a Necessity to use a Compulsitor, and a favourable Opportunity now offers, the greatest Part of your Lands being out of Tack: An Opportunity not to be lost.

In order to effectuate this good Purpose of improving your Estate, the first Thing I shall take Notice of is, That your Lands in this County especially, are not so fit for the Pasture of Sheep, as for other Uses, and they are destructive to Ditching, Hedging, Planting, and all Improvements by the Plow; wherefore you should discharge the keeping of them; every one of them on your Estate in this Country.

A Man possess of less Land than one Plow can work, cannot be presumed to live well, and bring up a Family comfortably by the Fruits of it, as 'tis managed in this Country, tho' the Land was his own; far less can it be expected that he can pay the Rent of it, and have wherewith to bestow upon Improvements at the same Time: Therefore, I humbly think, that all your arable Farms should be, at least, so large, as to require the Work of one Plow; for 'tis better for the Publick, and for the People themselves, who have smaller Farms, to serve Manufacturers, or other Farmers, and be paid for their Labour.

Tho' the Soil here be generally good, yet the Country is wet and cold; so, Ditching and Draining, Hedging and Planting, the first Steps to all
good

good Husbandry, would make the greater Improvement; and there is Encouragement to do the more that Way, that Hedging and Planting thrive exceedingly well here, in every Place where they are taken any tolerable Care of: But these, tho' executed, are only Improvements in Part, the Soil wants also to be, by proper Husbandry, relieved from the Distress it lies under, by the Effects of the former unaccountable Management: Yet this, I fear, must be a Work of Time; for the Tenants, as I am informed, are generally poor, and so cannot do much at once; they are not willing, and therefore must be compelled to do a little in a proper Way, that, by the Returns of it, they may be enabled, and encouraged to proceed voluntarily, for their own Profit, in the Course of Husbandry, the Sweets whereof they have tasted.

What to propose is a Matter of no small Difficulty: The Horse-hoeing Husbandry of Cabbages or Turnips, or even the losing of a Crop by a Summer-fallow, these highly beneficial Improvements, or any other Husbandry new to them, would, I am afraid, frighten them greatly, and so must at first be overlooked: One Thing is certain, Whatever Number of Acres you shall resolve to take the Tenant of each Plow of Land bound to labour and crop in the Manner to be herein after proposed, these Acres must first of all be sufficiently inclosed; but, I suspect, you will be obliged to inclose them yourself, taking him bound to pay the Interest of the Money laid out thereupon, to uphold the Fences, and leave them in a sufficient Condition. This Method of doing, has these Arguments for it. When it is done with your Money, and by your Order, it will be well done, and the Place will be chosen with Judgment, so as to answer the Design of the Improvement of it the better, and it will also be done in such a Manner, as not to
confound,

confound, or render irregular any after Improvements, which are considerable Advantages.

I would have the Ground to be inclosed, to be Land lying ley, and, when inclosed, I humbly propose that an equal Fourth of it be limed, at the Rate of from eighty to one Hundred Bolls, *Linlithgow* Measure, to the Acre, and that limed Ground to be plowed for and sowed with Oats, the other three Parts being allowed to ly ley for the first Year. The second Year, that the Oat-leave be sowed with Pease of the early Kind, or with Beans, or with Pease and Beans mixed, in the Option of the Tenant; and in this second Year, that another Fourth of the Field be limed as aforesaid, and plowed for, and sowed with Oats, the Remainder still lying ley. The third Year, that the Oat-leave be sowed with Pease or Beans as aforesaid, and that the Pease or Bean-leave be sowed with Barley or Bear, the Ground for this Purpose getting three Furrows, the first Plowing before Winter, and immediately after the Pease or Beans are taken off the Ground, that it may be benefited by the early plowing, the turning under Furrow of the green Stubble, and the Winter Frosts, &c. On three Fourths of this fourth Part of the whole Inclosure, I would have the great Clover Seeds sown with the Barley, at the Rate of twelve Pounds or upwards to the Acre; for I apprehend that, at first, it may not be very dexterously sowed: I would also have the Ground well water-furred, that it may ly as dry as possible thro' the Winter; and in this third Year, I would have another Fourth of the whole Field limed in the foresaid Manner, and plowed for and sowed with Oats, the Remainder still lying ley. The fourth Year, I would have what was Oats, plowed for, and sowed with Pease or Beans, as aforesaid; what was Pease or Beans, plowed for, and sowed with Barley, or Bear, as before proposed, and three Fourths of this Fourth
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of the whole Inclosure sowed with the same Quantity of the great Clover Seed, as before directed, along with the Barley or Bear. The last Fourth of the Ley, being the whole Remainder of Ley in the Field, I would have limed with the Quantity aforesaid, and plowed for, and sowed with Oats: The fourth Part of the Barley or Bear-leave, that was not sowed with Clover Seeds, I would have dunged with any Sort of long Dung, or Litter, and planted with Potatoes to be well hoed, and kept very clean. The fifth Year, I would have what was sowed with Oats, plowed for, and sown with Pease or Beans, as aforesaid; what was sowed with Pease or Beans, plowed for, and sowed with Barley or Bear, as before proposed, and three Fourths of it sown with the same Quantity of the great Clover Seeds, as before directed, along with the Barley or Bear; the Bear-leave that was not sowed with Clover planted with Potatoes, as aforesaid; and what brought Clover sown with Oats: Or, if the Tenant can be prevailed on, to agree to plow down the second Crop of Clover, I would rather have Wheat sown on this Part, after one or more Plowings, as shall be found proper; and I would have that Part which was planted with Potatoes, sown with Wheat or Flax Seeds, or Part of both, and the Husbandry both of plowing and cropping of this whole Field, proposed to be inclosed, to be varied and carried on for the sixth, seventh, and every succeeding Year of the Tack, in the very same Way as directed for the fifth Year, always observing that the Potatoes be never planted in any Place where a Crop of them had been before, until the whole Field hath got a Dinging, and the Potatoc Husbandry be executed upon it; then to begin with the Husbandry of them, as at first, and so to go on in a regular Course. I would have advised Dungings along with the Limings, if I had thought
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the Tenant could have Dung, that he would agree to apply so.

Before I go further, I advise that the Clover be cut, and carried off the Field, to be eaten elsewhere green or in Hay; for Beasts must never enter it, after the Commencement of the Clover-Husbandry, except in a very dry Time to eat up the Foggage; because in wet Weather they potch the Ground, destroy the young Clover, and the Plants of Wheat, if any are sown.

If Attention is given to this Plan, if it is fully understood, and if Allowance is given for this Bar that was in my Way, that the Farmers I had here to do with, are so poor, ignorant, and lazy, and so easily to be affrighted (as I am informed) that I was afraid to meddle with any expensive or laborious Husbandry, not so much as with a Summer Fallow, I expect that every intelligent Husbandman will allow, that it is pretty well calculated to answer the End proposed: It has the Advantages known to arise from the most judicious and profitable Part of our Husbandry, the Variation of Crops; for one of the most meliorating always succeeds a deteriorating: None of the Crops require more Plowings than one, except the Barley or Bear; which is a common Case, even in Part their own Practice. They give two Plowings for either of them, I propose only three: They may, probably, through Ignorance except against plowing up the Clover for one Year's Cutting; but 'tis well known that this is the most approveable Method: The Farmers in those Counties of *England*, where the Clover Husbandry is most practised, and best understood, are so sensible of it, that they proverbially say, He, who keeps his Ground in Clover for one Year only, is wise: He who keeps it for two is foolish; and he who keeps it for three is mad: They, generally, plow down the second Crop of

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it, and sow Wheat without Dinging, or more Plowing; their Experience has so much convinced them of the great Benefit arising from this Method of sowing Wheat, after Clover only once cut.

My Scheme has also this Advantage attending it, that it directs your Tenants in the Husbandry of the most profitable Crops; it learns them like ways how to vary them with such Judgment, that the Ground, even without losing a Crop by a Summer Fallow, shall, with a Dinging in each eighth Year, become rich, after being once limed, and continue to be fertile and clean; and I venture to say, that, in what I have advanced, I am not only well founded in Principles, but, I flatter myself, that, by a Jury of the best Farmers in *Great Britain*, their Verdict would be given, that I have also proved the second Part of my Promise, *viz.* That I should point out a Method of Husbandry, plain, easy, and very moderately expensive, by which, if exactly followed furth, your Lands must grow better and better, your Tenants become richer and richer, your Rents rise, and be better paid.

To this End you should, now, when the greatest Part of your very large Estate is out of Tack, endeavour, by all possible Means, to perswade your Tenants to become bound, in the next Leases you grant them, to the Performance of the Conditions mentioned; but as your Estate is great, and you are young, the rising Sun will no doubt be worshipped, and you will, probably, get many different Advices from Persons unasked, and not well qualified. You may possibly be perswaded, by the Influence of bad Counsel, to attempt extensive Improvements, in plowing Husbandry, by your own Servants and Day Labourers: Dangerous Works for a Person of your Rank and Degree: Works which may end in your great Expence and Loss, and may, in the mean time, be the Cause of the Destruction

on of Numbers of your Tenants; whereas they must grow rich, at the Time that your Estate must be highly improv'd, without your being put to the Charge of a Shilling unemployed, as if on heritable Security, by the Prosecution of this my Plan, which your Tenants being bound to the Performance of in Manner aforesaid, must, surely, have all the good Effects I have mentioned, if rightly executed: And, I humbly think, the Way to obtain this, is to engage some proper Person to travel through every Farm of your Estate twice in each Year; immediately after Harvest, to direct the Labour for the following Crop, and in the succeeding Spring, to observe how the Works are wrought. By this Means, he making, at each of these Times, careful Observations, and a particular and distinct Report, you will know how the Improvement of your Estate goes on, which of your Tenants seem to be thriving, which not; which Farm appears to be higher rented, which lower. Whatever Way you shall think proper to take, I wish you Success; and if, in a competent Time, it shall be found, that I have performed my Duty to you, in a Matter of so great Importance, my Ambition shall be amply gratified.

AUthors should indeed endeavour to serve and please the Publick; but Mens Opinions and Inclinations being so various, who can humour them all? Having more miscellaneous Papers on Husbandry than I purpose to put into this Volume, seeing I intend a second; and, having shown several of these Papers to my Friends, some of them desire me to publish one, and some another of them, but I cannot obey them all, without departing from my Resolution: Besides, several of
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the Gentlemen who were pleased to hear my Lectures in Winter last, insist that I should publish them, to which I do not incline to comply at this Time; but to gratify the Gentlemen last mentioned in part, I shall subjoin my first and second Discourses. They follow:

GENTLEMEN,

ALL Mankind being considered as one Body, and each Individual as a Member thereof, every Man, endued with rational Powers and Faculties, is bound, by the Laws of Nature and Society, to act that Part, on the Stage of Life, which he thinks most conducive to the universal Good. Therefore, having studied with more than common Application, the Knowledge of Vegetation, of Soils, of the different Effects that Plants have on them, and of other Matters relating to Husbandry; and having, on several Occasions, offered my Thoughts on these to the Publick, and likewise in many Memorials concerning the Improvement of Ground, which are not yet published, and all these having been, so far as I know, favourably received; I intend, at the Desire of several Gentlemen, to lecture on HUSBANDRY in this the Metropolis of my Country, in hope of being honoured by the Attendance and Approbation of the Lovers of it.

All Men ought, surely, to be Lovers of their Country; even such as have no publick Spirit should, for Self-interest, promote the Prosperity of it; for, on this the Happiness of the Community, their own Happiness, and the Happiness of their Families, in this and after Ages, in a high Degree depend; and having observed a general Run after, and much Money spent on mere Amusements, why should I doubt, but my Hope of Attendance
is

is well founded? seeing I am to discourse on the most valuable Science.

What is so valuable as Husbandry rightly practised? Was there ever a wise and good Man who was not a Lover of it? *Solomon* was, and studied the Nature of all Plants. *Xenophon* tells us, that *Socrates* said, *Ille quidem præclare, qui artium ceterarum parentem nutricemque dixit Agriculturam: nam quando bene agitur cum ea, omnes aliæ vigent; ubi vero necessitas coëgit terram deseri, & incultam manere, propemodum terra marique extinguuntur.* You see the wise *Socrates* was perswaded, That Agriculture is the Parent and Nurse of all other Arts: That they flourish when it is rightly pursued, and that it should never be neglected, because then every Thing goes to ruin by Land and by Sea: And *Columella* cried out, *Sola res rustica, quæ sine dubitatione, proxima & quasi consanguinea sapientiæ est, tam discentibus egeat quam magistris.* And had not he, and the best Writers on Husbandry since his Time, great Reason? seeing Agriculture, I believe, had never a Professor appointed for it by any Government, tho' it is the Preservation of all Mankind; yea, *the King himself is served by the Field.*

Altho' there is not, or perhaps never may be in our Time, a College of Husbandry established by Authority; yet surely, every probable Opportunity of improving in the Knowledge of it should be embraced. No *Briton* should, on any Consideration, be discouraged, and protract or delay the Improvement of his Grounds; for I know of no considerable Quantity of uncultivated Land, which may not be improven to good Advantage, for one Purpose or another. We should never, like the Sluggard, cry out, *There is a Lion in the Way*, and blame our Climate and Soil more than they deserve, the Fault being in our Want of Knowledge, or Diligence, or Strength sufficient for carrying

rying on our Undertakings; but be persuaded, that it is only by Chance, if Diligence, unless directed by Knowledge, serves any profitable End. What is worst of all, too many are sadly incorrigible, and tenacious of Errors, because they are old, and wiser in their own Conceits, than seven Men who can render a Reason.

How mean, in Comparison to what they are now, was the State of our Husbandry and Manufactures before the Year 1723? A Period, happy for *North Britain*. Then several Noblemen and Gentlemen, afflicted with the Consideration of the low Condition of *Agriculture* and *Manufactures*, and excited by Love to their Country, did institute the *Society of Improvers in the Knowledge of Agriculture in Scotland*; and the Number of the Members increased so much, that it amounted to upwards of 300 of the Flower of the Nation, whereof about fifty were Peers. Infinite was the Good they did to their Country; particularly, by receiving Memorials, and answering Queries concerning Husbandry and Manufactures, by their Proposals relative to the Application of the publick Funds, drawn up by a Committee of their Number; by their Application to the Royal Boroughs for their Concurrence; by their joint Application with the Royal Boroughs to Parliament; by the Acts of Parliament in consequence of that Application, and by the King's Patent following thereon, naming Trustees for the Fisheries and Manufactures, almost all chosen out of the Society. Before this Society commenced, we seemed to have been Centuries behind our Neighbours of *England*; now I hope we are within less than one, to what they are, with regard to either Husbandry or Manufactures.

What Happiness was it to our Country, when our Nobility and Gentry were of such a Spirit? a Spirit which then arose, and is not yet unactive:

No;

No; we have such among us at this Day, as regard alone the Good of their Country, and who expect no other Reward for all their Trouble, but the Blessings of the poorer Sort of their Fellow Subjects, who, by their Examples and Instructions, learn of what Advantage Industry is to themselves and to the State.

Tho' the Society mentioned, which flourished for more than twenty Years, be now declining, by the Death of near all the Founders, except Mr. *Hope of Rankeilor*, who for his Merit has been almost constantly chosen Præses; and who, by the Honour I see he has done me by his coming here, restrains me from particularizing, at this Time, his Services to his Country; yet a large Number of benevolent and beneficent Noblemen and Gentlemen have founded another Society, called *The Edinburgh Society*, which is prospering, and I hope will do much Good.

The Advantages we have received, and are still receiving by these Proceedings should, methinks, induce all Men to embrace every Opportunity of being instructed; for even our best *British* Husbandry, by comparing it with what *Virgil* hath taught, appears to have been only *Roman* until of late: Which *Roman* Husbandry Mr. *Tull*, in his Remarks on *Virgil's* first Georgic, hath satisfied some, who would yield to Reason, to be wrong in several Cases, as proceeding on erroneous Principles; and indeed, what could, or can be expected from false Principles, except bad Practice? But the Truth is, the far greatest Part of Land Labourers never trouble their Heads about Principles, but work more like Tools or Machines, than Men of Reason, going on blindly, as led by Custom, in the often unaccountable Ways of their Forefathers.

A diligent Practice of Husbandry, carried on according to rational Principles, could soon indeed make us rich and happy ; but then Husbandmen must allow themselves to believe, that Agriculture is a reasonable Thing, a Science founded on Principles from which there is no departing, without going into bad Husbandry. They must never once imagine, that the Practice of their Forefathers is not to be amended, or lay Stress on what they call their Experience, unless they are sure, that the Experiments on which they found it, have been tried once and again properly, and by Rules that cannot be contradicted, always making Allowance for Seasons, which may have better or worse Influence on Experiments.

I humbly think there was never greater Necessity and Encouragement for making Improvements in Husbandry than now, when the Markets are, and have been so very dear for several Years, and People are generally gone into so high a Way of living ; for, as the Prospect of ready Consumption for the several Products of a Farm, gives the greatest Encouragement to improve it ; so, on the other Hand, the better or worse Success of Manufactures and Trade depends chiefly on the greater or lesser Quantities, and better or worse Qualities of all Sorts of Provisions.

Wherever People can live well and cheap, thither they will resort ; there they can afford to work cheapest, there they will labour with the greatest Vigour both of Body and Mind, and there they will not be discouraged from entering into the conjugal State by the Fear of Want : Thus a Kingdom becomes rich and happy, for it is in the Number of industrious Inhabitants, and the Plentifulness of Provisions, that the true Strength and true Riches of it consist.

I have

I have enquired at some of the greatest and most intelligent Manufacturers in this Kingdom, the Reason why the *German* Linen Manufacturers, and even the *Irish*, with respect to coarse Cloth, can afford to sell cheaper than our Manufacturers thereof can well do, and the Answer I got was this: They live cheaper, and so can sell cheaper; the Abundance of their Provisions encourages them to marry, so the People increase greatly, and there is no Deficiency of Hands: Besides, their Flax, *said they*, being raised in their own Country, they have it the cheaper, and the Money is kept among themselves. What can bring us into an equal Condition with them, but, first, Improvement in the Knowledge of Agriculture, and then a diligent Practice of it, founded on just Principles?

Now, having endeavoured to convince you, that Husbandry is the Source of all solid Riches, and the Life and Support of all other Arts and Sciences, yea, of all Mankind; I purpose to show you, that it is a Science which cannot be rightly practised, but by reasonable Rules, and that all good Husbandry has certain and fixed Principles, which I shall explain; and further, that all Practice disconform thereto must be bad, tho' established by Custom as old as the Creation.

Thereafter, I shall suppose a Farm, consisting of all the principal Soils, capable of all the Improvements I can think of, and then I shall lay before you the different, and the best Ways of improving every Part of it, conform to the Principles I shall have laid down, always giving Reasons, that by the Strength of them, what I say may be judged; and, as I go along, I shall probably give you my Opinion concerning the consuming of the Crops in the most profitable Ways: This will, I humbly think, be at least as rational, and as useful

ful a Way of treating on Husbandry, as any Man has taken before me.

Lastly, I shall be able, yea, I am able to show to you, or any other competent Judges, when properly called to it, that from a right chosen Farm, well improv'd, a greater Balance of free Profits may be drawn, than can be got by any Manufacture, or any lawful and unprivileged Trade in *Great Britain*, in the same Space of Time, and on the same Sum that may be necessary for the Farm, if a reasonable Allowance is given for different Hazards: But if any Farmer will make himself Master of the Principles of Agriculture, and, acting diligently and exactly conform to them, undertake no more than he can, and does perform in the properest Time, leaving nothing undone that I shall propose, he will soon be satisfied, that he needs no Proof of the Proposition I have advanced concerning the Profit of Husbandry. And since I have spoke of Trade, I beg Leave to lay before you the Opinion of the *Dublin Society* concerning it.

“ The greatest Part of the Goods we take from
 “ other Kingdoms in Exchange for ours, are so far
 “ from being of Use to us, *say they*, that they de-
 “ stroy the Industry of the Poor, and only supply
 “ the Luxury of the Rich.

“ Whilst we consume such great Quantities of
 “ foreign Commodities, we so far encourage and
 “ employ the Poor of other Countries, and starve
 “ our own.

“ As the Strength and Riches of every Country
 “ are founded on the Number, Frugality and Indu-
 “ stry of its Inhabitants, it should be the Aim and
 “ Business of every State, to find Employment for
 “ their People. Where the Community are fully
 “ and properly employed, they will not fail to be
 “ rich,

“ rich; and where any great Numbers of them are
“ idle, the whole will be poor.”

In fine, I look upon Husbandry, Manufactures and Trade, as three Brethren, who work to one another's Hands, and Husbandry as the eldest, and the chief Supporter of the other two, to deserve at least a double Portion of our Attention and Diligence. But still I suspect, that you think my Proposition, concerning the greater Profits possible to be drawn from Agriculture, than from either Manufactures or Trade, to be very extravagant: However, I have not been able to help my being, for a long Time, confident of the Truth of my Assertion.

I have maintained it in different Parts of *Great Britain*, on several Occasions. Being employed by a very considerable Merchant in *Whitehaven*, who is a Gentleman of good Understanding and Intelligence, to direct the Improvement of his Estate, and to write a Memorial for that Purpose*, I therein offered to support the same Proposition against him or any other Merchant in that Town; a Town you know flourishing by Trade: And I insisted, that the full and unvaried Execution of the Directions I had offered, would prove it to his Conviction; which, after weighing my Reasons, he admitted.

Thus, Gentlemen, I have thought proper to introduce a Course of lecturing to you, upon the most ancient, the most honourable, the most innocent, the most healthful, and the most delightful, yea, the most profitable of all Arts and Sciences; and I wish I may prove instrumental in destroying a Multitude of bad Customs, too generally followed, and of spiriting up, diffusing, and establishing among us rational Husbandry, founded on just Principles, which I shall to my Power endeavour.

* The Memorial is published Page 248.

To this Purpose, I shall, in my next Lecture, begin to show you, that good Husbandry is, as I have said, a Science which cannot be practised, but by reasonable Rules; that it has certain and fixed Principles, which I shall explain; and, further, that all Practice disconform thereto, must be bad: And thereafter, I shall go on as before-mentioned.

If any Gentleman is not satisfied with what I have said in this my Introduction, or may say in any of my publick Discourses, I am willing, after my Lecture is finished, to endeavour to give him full Satisfaction concerning any Objection, or even Doubt which may occur to him.

LECTURE II.

GENTLEMEN,

IN my Introduction I promised, that, in pursuance of the Plan I therein laid down, I should show you, that good Husbandry must be founded on just Principles; that all Practice disconform thereto must be bad; and that, as Husbandmen must know what they are, before they can, with Certainty, act consistently with them, I said, I would mention and explain them: Now, I am to enter on the Execution of my Design.

Inclosing, Dividing, and Sheltering of Ground, are established Maxims, or Principles of, and the first Steps to good Husbandry.

By Inclosing and Sheltering we can even improve the Climate; for we see the Fruits of the Earth are earlier and better in Inclosures, warmed by Hedges and Trees, than in the open Fields of a richer Soil.

Who can properly call their Ground their own, while it is open? for are not all Sorts of Cattle daily trespassing, even in the Spring, Summer and Harvest, on Grounds to which their Owners have no Right, and after Home-harvest Beasts are allow-
ed

ed to go where they will : We have indeed a Law for Winter-herding ; but if any Man puts it in Execution, he creates to himself the Enmity, not only of every Transgressor, but, likewise, of every Man who hath open Ground, and so may probably transgress ; which being hazardous, almost no Man chuses to expose himself to the Inconveniencies, yea Dangers, that might follow : For it is difficult to guard against, and prevent the Mischiefs, that flow from the Resentments of an unreasonable and enraged Multitude ; besides, the best and most profitable Parts of Husbandry are debarred when Grounds are open.

If even the Farmer's own Cattle are at their Liberty, Winter Corn is eaten, trampled, and destroyed by them : To the beneficial Husbandry of Turnips and Cabbages, in the Horse-hoeing Way, and in the Place of a Summer-Fallow, for Winter feeding of Cattle, they are an absolute Bar ; for they will destroy them before Winter : And tho' it may be reasonably computed, that one Acre of Ground reduced to a fine Mould, sown with Clover, and thereafter well managed, will feed as many Cattle, and as well, as four Acres of the same Soil, tho' both have been equally well dunged, if the four Acres are allowed to go to natural Grass ; yet, in open Grounds there is no practising this highly profitable Husbandry with any tolerable Success, for the Clover would be ruined by the Cattle.

This Estimation of the greater Advantage by Clover, than from natural Grass, is far from being immoderate : That one Acre of some Sorts of strong Clays, or Carse Soils, will hardly maintain a Sheep, through the Year, for the first, second, or even the third Year, after going into natural Grass, is notorious ; and yet one Acre of either of these Soils will, without the Assistance of any Manure more than the other got, produce, for the first two or three Years, as much Clover yearly, the Ground

Ground having been sowed with its Seeds, as will maintain four or five Cows, during the whole Season of eating cut Clover, if it is only given them in the House, and the Ground hath been reduced to the Fineness of a Garden Mould before the Clover-seeds were sown.

What an immense Loss is it then to the Farmer, to be debarred from such an advantageous Crop, by the Openness of his Ground? A Crop that enriches the Land it grows on, tho' it be cut and carried off it, for the first, or even for the second Year, as is shown Page 234. and yet he often cannot, or in Prudence should not help it.

If he is poor, he cannot; tho' he be rich he should not, if his Lease is short, lest at the End of it, the Land, inclosed at his Expence, be set to the highest Bidder: So it seems reasonable, that Proprietors should either grant long Leases, or be at the Expence of inclosing, the Tenants being bound to pay the Interest of the Money expended thereupon, to uphold the Fences during their Leases, and to leave them sufficient at the End thereof.

What reasonable Objection can Gentlemen make to this? Would not Money, expended as before-mentioned, be as securely, and more profitably employed, than in buying Land at twenty Years Purchase? Moreover, should not every one of them get their Land measured, planned, and if they are not sufficient Judges themselves, should they not get the Soils of every intended Inclosure described, and the Husbandry of it directed by one qualified, in a Memorial relative to the Plan? And then, should they not encourage, and take all probable Ways to persuade their present Tenants to become bound, in the next Leases to be granted them, to the Performance of such Articles and Conditions as may appear to be profitable for both Parties; to themselves first, and to their Masters subsequently?

subsequently? And, in case of the Obstinacy of the present Tenants, should not Masters take all possible Pains to find out others persuasible, and set their Grounds to them under proper Covenants?

Would not this be a regular and prudent Way of proceeding? Would not the getting Memorials concerning Farms, from a Person qualified, assist Gentlemen to know what they should ask, and Tenants what they should grant? Would not Gentlemen's riding through their Farms, exciting and encouraging their Tenants to labour their Grounds conform to reasonable Rules, and observing that they take proper Care of the Fences, be a pleasant, commendable, and profitable Way of amusing themselves, and spending a Part of their Time? And that their Arguments may be the more prevailing, should they not show Examples, which may evidently appear to their Tenants to be profitable for them to follow, when the Crops and the Expence of obtaining them are considered?

The *Dublin* Society put the following Question to the Gentlemen in *Ireland*: "Of what Use is
 " that Gentleman to his Country, who never sees
 " his Estate, and neither plants, builds, nor makes
 " any Improvement himself, nor gives Encourage-
 " ment to any other to do so upon his Lands; but
 " spends the Income of his Estate, either abroad
 " for the Benefit of other People, or at Home in
 " foreign Superfluities?

" When a Gentleman lives upon his Estate, and
 " employs the People about him in improving his
 " Lands, raising Plantations, building Houses, and
 " promoting Husbandry and Manufactures among
 " them, at the same time that he advances his
 " private Fortune, he has the Pleasure of support-
 " ing the Poor, that are industrious, and serving
 " the Publick by their Labour,

" In

“ In how amiable a Light must such an one
 “ appear to his Country, who thus dispenses Bless-
 “ ings continually to all around him, and lives to
 “ Posterity in the Improvements and Ornaments
 “ of his own raising ?”

But pray, Gentlemen, bear with me, till I show you in another Light, the immense Loss suffered by this Openness of our Grounds. There are about 1000 Parishes in *Scotland*, but counting them at 1000, to make my following Computations the easier, and the Herdsmen in every Parish to be fifty, one with another : Might not these Herdsmen be bred up to Husbandry, Gardening, Manufactures, and Fisheries, to the immense Benefit of the Community, if our own unaccountable Management did not make them necessary ? And reckoning the Meat and Wages of these 50000, at two Pounds ten Shillings each, for the Summer Half Year, you see the Expence of them is no less than 125,000 Pounds *Sterling* yearly, for that Half of the Year only.

I doubt not but the Number may be much greater than the Fifty thousand ; for tho’ in some Town Parishes there are none, or in a few Country Parishes not so many, yet I have often seen a Herdsman following two or three Cows ; and I have known, in several different Counties, a Tenant, who did not pay above fifteen or twenty Pounds of yearly Rent, have a Herdsman for Milk-cows, another for dry, a third for Calves, a fourth for Ewes, a fifth for dry Sheep, a sixth for Lambs, and a seventh for Horses, all at one and the same Time : I own this is only done in some Parts of the Kingdom, and that ’tis only some Tenants there who have so many ; yet the keeping of more than one or two is very common, even Cottars have Herd boys.

As to the Expence of their Meat and Wages, I believe, one with another, the Estimation is low ;
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for you see I have stated nothing for herding in the Winter Half-year, and several of them are then that Way employed, tho' as our Grounds are open, too few.

'Tis a happy Thing, however, that this State is not universal; many Gentlemen have now got Parks about their Houses, and some Farms are in different Counties inclosed and divided; yet when I consider the immense Loss the Kingdom must continue to suffer, till our Grounds are at least generally inclosed, my Indignation rises at the Conduct of by far too many of my Countrymen, for their unaccountable Neglect concerning this important Matter.

Might not each of these 50,000 Herds have been made worth, one with another, Six pence a Day to the Publick by their Labour in the Manufactures? I presume they might, and still may; and if so, then the Sum arising thence to the Community would be no less than 390,000 Pounds in one Year: I say in one Year; for almost the whole of them are idle, or begging in the Winter, except such as drive Ploughs, and these are, exceeding few Cases excepted, useless Servants: Many of the *English* labour better without them than we do with them; and the greatest Part of our Land is as easily plowed as theirs, if it was freed of Water and Stones, once brought into as good Tillage, and thereafter managed with equal Prudence.

Is there one intelligent Farmer, who, considering the State of Agriculture in *Scotland*, can doubt that the inclosing and dividing of even our arable Lands, would give us Advantages of Improvement, which we are debarred from while they are open, whereby we might have it in our Power to reap yearly Profits, far greater than these immense Sums added? This I have shown to you, in Part, in the Case of Clover, and shall make appear evidently,

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when

when I come to discourse to you on the Articles of Wheat, Rye, Turnips, Cabbages, &c.

What have we been doing? Have we been stupid? or have we been only sleeping? If so, let us awake, let us rouse up and exert ourselves: Riches and Poverty are before us, let us make our Choice. But, at the same Time, let us not forget that we seem to have lost, by the Expence of Herdsmen, by the Want of their Labour in Husbandry, the Manufactures and Fisheries, and by being debarred from many of the most valuable Parts of Husbandry, by the Openness of our Grounds, more than 1,545,000 Pounds *Sterling* every Year; tho' the Value of eaten Corn, which would surely amount to a very great Sum, be overlooked, and not brought into the Calculation.

The *English* are rich, and we are poor, when compared with them: The Reason is obvious: They, few excepted, have inclosed, divided, and improved their Grounds, which hath laid a sure Foundation for Manufactures and Trade, and makes them both flourish; and, reciprocally, the Success of them promotes their Husbandry. But we, while our Grounds are open, cannot improve properly, or, in most Cases, to the Half of the Advantage that we might do, if they were inclosed and divided; and so, until they are inclosed, we must still fall farther and farther behind them, for Husbandry is the Support of every Thing.

I cannot conceal my Wish, that the Legislature may, and my Hope that they will soon think, the Loss we sustain by the Want of Inclosures, well deserves their Notice: If Argument and Persuasion prove unsuccessful, Laws and Penalties should be called in Aid for the publick Good: And, I believe, an Act to oblige Gentlemen to inclose their arable Grounds, at least, would more effectually advance the Interest of *Scotland*, than any Law that has

has been yet made for the Benefit of it. This would be laying a firm Foundation; for then we could carry on our Manufactures with Success, and independent on any other Nation, for almost any Provision or Material.

If we will, beginning with Inclosing and Dividing, improve our Grounds properly, we must be rich, and may be happy; if we will not, we must be poor and miserable. Between these I can see no Medium; for the *Irish* will, sooner or later, I am afraid, ruin our Manufacture of Linens, by being able to sell cheaper than we can possibly do, seeing they are pushing Improvements in Husbandry, the Flax Husbandry especially, which will give them cheap Provisions, Materials, and Labour, the Money being kept among themselves; while we, I am informed, import eight Parts of Twelve of the Flax we use; and, by neglecting to improve in Husbandry, as we ought, must pay dear for both the Materials for our Manufactures, and the Labour of our Workers.

If by the Destruction, or even Discouragement of the Linen, our chief, yea, almost only Manufacture, our Consumption of Goods imported shall exceed in Value the Articles exported, the Kingdom, as I apprehend, will be undone by Trade, tho' some may be enriched by it. But, O Husbandry, thou canst save us! For, by inclosing our Grounds, we can improve them properly: Then, by the great Plenty and Cheapness of Provisions and Materials raised at home, our Linen Manufacture can prosper, and, by the Support of it, a Trade highly profitable for the Kingdom can flourish; and then, if we are not idle or prodigal, we will be rich, and may be happy. You shall be informed of the different Ways of inclosing, in my succeeding Lectures, when I come to speak of the Improvements of the several Parts of the Farm, which

which I am to suppose, as set furth in the Plan mentioned in my Introduction, above inserted.

To corroborate my Sentiments concerning the mighty Advantages arising from INCLOSING, I presume, it will be acceptable to the Readers, to subjoin a Letter on the same Subject, to the Author of the Caledonian Mercury, as by him published on the 5th May 1757. It follows.

S I R,

WHEN I consider the various Plans which have been formed and set on Foot, for increasing the Wealth of the Kingdom of Scotland, I am surpris'd that no Body has ever formed and promoted a Scheme for improving the Soil, and thereby increasing the Quantity of Provisions, which one would think are the Source and Spring of all the Trade and Wealth of a Country.

Our Fisheries, our Linen and Woollen Manufactures, in all their Branches, are certainly very noble Designs; but they seem to be a Sort of Superstructure without any solid Foundation, so long as the Ground does not produce Provisions sufficient to maintain the Manufacturer and other Inhabitants, at a reasonable Price, and in Proportion to our neighbouring Countries.

For when the Necessaries of Life rise high, the Merchant must either allow the Manufacturer a higher Price for his Labour, which will lower his Profits in a foreign Market, if not quite stop the Export; or the Labourer must go elsewhere to seek daily Bread, either of which will make the Trade languish, perhaps wholly put an End to it.

I cannot help thinking that the true Foundation of Wealth in England is the great Plenty of Provisions of all Kinds, produced by the proper Culture of the Soil. For it is certain, that notwithstanding the yearly Export of vast Quantities of Grain,

Grain, Bread and other Necessaries of Life are cheaper, every Thing considered, in *England*, than in most of the remote Corners of *Scotland*; tho' we frequently import, to our no small Loss, a great deal of their Grain.* To what can this be owing? Certainly to the Produce of the Lands, bearing a low Proportion to the Number of Inhabitants; and I believe one Cause why Provisions have for some Time by-past been so high, is the fixing a Number of People at home by our Manufactures, all these being Consumers, and not Increasers of them. But how shall this Evil be remedied? Very easily, would those, in the Management of publick Affairs, apply a little of that Money which they so plentifully raise off the Nation, as an Encouragement for inclosing the Ground.

I believe it will not be disputed, that were the Country well inclosed, particularly with Hedges and Planting, effectually to warm the Soil, and secure every one's Property to himself, Corn would be produced in greater Abundance, and all other Improvements follow of Course. For who does not see, that the Want of warm Inclosures, exposes the Wheat to the cold Winds in Winter and Spring, and to be troden and eaten by Cattle, particularly by Sheep, which renders the Crop extremely thin, and the Grain poor, and likeways ruins the Grass of all Kinds?

To the Want of Inclosures must also be ascribed the odd Method of labouring, generally practised by the Country People. I mean the Tilling of the Ground, so long as they can expect two Seeds, because, seeing their Grass turn to no Account, they think such a small Return better than nothing:

* The present Scarcity of Grain in *England* is singular, as the like has not happened for more than half a Century.

thing: And indeed I am sorry to find, on conversing with the Farmers in some of the best Corn Countries, that they are content with four Seeds': I have Reason to believe that the general Produce is not so much; if so, it is easy to see that Scarcity must be the Consequence of even a middling Crop.

But it would be wasting Time to dwell longer on the Benefit of inclosing, the Example of our Neighbours shows it better than Cart-loads of Arguments.

To attain, therefore, so salutary an End, I would humbly propose, that the Legislature should allocate, out of some Fund which can best spare it, a Sum certain yearly, for the Space of six or seven Years, to be distributed as Premiums to those who will inclose their Grounds.

That this Money should be committed to the Management of Trustees, to be appointed in every County.

That they have their general Meetings at *Edinburgh*, and have Power of chusing proper Officers, and likeways of appointing Committees of their own Number, to meet at what Places they think fit.

That they shall consider, and agree upon the best Method of inclosing Grounds, particularly with Thorn Hedges and Planting.

That every Possessor of Ground, whether Proprietor or Tenant, who shall propose to the Trustees to inclose any Part of his Possession, in the Manner directed by them, shall be intitled to the Sum of ten Shillings *Sterling* for each Acre he shall inclose, and that at a Time certain, after such Inclosure is perfected, on his finding Caution to preserve and support the Hedges and Planting for a determined Number of Years; but that none be entitled to a higher Premium, for one Inclosure;

sure, than the Sum of five Pounds *Sterling*, and every Person to be preferred according to the Date of his Proposal.

It is sufficient here to mark the Out-lines of a Plan, one at large would exceed the Bounds of a Letter.

I shall beg Leave to observe, that it is necessary to give so high a Premium, that it may be an effectual casting Weight in favours of Inclosing, to overcome the Obstinacy of the Tenant, I wish I could not say of the Proprietor; though it is certainly more than ever, the Interest of the last, seriously to apply himself to improve his Estate, now when the Price of every Thing is almost double what it was thirty Years ago; so that a landed Gentleman must either increase his Income, retrench his Expences, (which is not easily done,) or become Bankrupt.

At the same time that I would give so high a Premium, I would limit it so, as one who had a Mind to inclose 50 or 100 Acres in a Field, should not have three or four Times as much as it cost him. In short, I would direct the Thing in such a Manner, as the Ground should be generally inclosed in ten or twelve Acre Fields; for I reckon about seven Pounds will inclose a ten Acre Field with Ditch and Hedge, and when one Inclosure is made, less will do, and I think a Field of that Size large enough in so open, so bleak a Country. I would likewise point the Encouragement principally to the inclosing with Hedges, and yet not quite exclude Stone Dykes, as it would be hard to debar those who could inclose their Ground only in that Manner, from any Share of the Premium. But that Sort of Inclosures can never become general, on account of the great Expence, and are neither so beautiful nor beneficial.

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The Sum, which in my humble Opinion ought to be allowed for this valuable Purpose, might be 3000 *l.* a Year, to be continued for seven Years, which, if honestly managed, and impartially distributed, would inclose 5000 Acres yearly, (allowing 500 *l.* for necessary Expences, such as paying Clerks, Surveyors, &c.) This in seven Years would amount to 35,000 Acres; and if that Quantity was inclosed in the different Counties of *Scotland*, I dare say no Body entertains a Doubt but the Proprietors of the rest would soon copy after the Example, for I need not observe, that the Intention of my Plan is only to set the Thing a-going.

Now, Sir, could the Noble and Honourable Persons, who have the Management of our publick Affairs, grudge so small a Sum to promote so good an Effect? An Effect! which would be a Blessing to the Community, and consequently to every Individual.

For would not Plenty be the native Attendant of such an Improvement? Would not the Tenant be able to give the Proprietor more Rent for his Ground, and at the same Time live better himself? Would not such Plenty increase the Number of Inhabitants, which would make our Fisheries and our Manufactures flourish, and contribute to the further Culture of the Ground.

It will probably be objected, that these in the Administration cannot now, when we are engaged in an expensive War, divert any Part of the national Supplies to such a Purpose: But with Submission, one would think that such a Measure is more necessary now than ever, as it will be possible to find Ways and Means to raise Money off an improven Country.—What if the Window Tax, which in its present Situation defrays little or none of the real Expences of the Kingdom, was appropriated this Way? It would then perhaps be more chearfully paid. *I am, &c.*

The ingenious and publick spirited Gentleman who wrote the above Letter, having favoured me with a Copy of it in Manuscript, I read it to the Hearers of my last Discourse, and then I added as follows:

IF the Government shall not give the Encouragement proposed, would it not be highly commendable, and to the unspeakable Advantage of the Proprietors of the several Counties, (in order to excite the Spirit of Inclosing, and promote a Design of so mighty Importance, the only Undertaking that can lay a sure Foundation for the Prosperity and Wealth of Scotland) to assess themselves in a certain Sum yearly, for a determined Number of Years, to be applied as Premiums to such of them as shall inclose on the Marches of the other Gentlemen's contiguous Grounds, and become bound to maintain and uphold the Fences for a fixed Time. The yearly Premiums, I think, should be given by casting or drawing of Lots: The Gentlemen who obtain the Premiums for the first Year, should be excluded from any Chance in the second: They who get the Premiums for the first and second Years, should be debarred for the third, and so on till every one of the assessed obtain a Premium: The Reason for allowing Premiums only to those who shall inclose on the Marches of contiguous Grounds of other Heritors, is, because these other Heritors are, by Law, bound to be at equal Charges, and so the Sum assessed for, will go so much the farther, as has probably occurred to you all.

This is only a Sketch of another Plan, which, if the Government will give no Encouragement, might be improved into such a Scheme, as could not fail to be of infinite Advantage if executed:

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cuted: It would be an excellent Thing, if Gentlemen's Eyes could, by any Means, be opened, to see their so great Interest, and then be persuaded to pursue it with Diligence.

Being informed that The Society for propagating Christian Knowledge, having a just Sense of the great Benefit that would be found by blending Instruction in the Principles of Christianity with that in Labour, and their first Charter not empowering them to employ any Part of their Funds towards the Education of Youth in useful Arts, had applied for and obtained a second, enabling them to lay out a Part of their Stock upon Agriculture, the Mother and Nurse of all Arts and Sciences, and the Instruction of Youth in the Knowledge thereof; I was advised to offer them a Memorial: Which I did. It follows.

THE Memorialist is possessed of a Farm of near 50 *l.* a-year Money-rent, containing about 130 Acres, all arable, lying at *Cliftonhall*, within six Miles of *Edinburgh*. It is partly inclosed; and he inclines, without loss of Time, to inclose and divide the rest, having a Lease yet to run of upwards of three nineteen Years. The Soil is in part Clay, in part Loam, or Sand and Clay mixed, and in part a light Soil.

Having observed, that this Farm naturally produced the red, white and yellow Clovers, Fitches, and other rich Grasses, and a considerable Burden of them, he thought fit to humour the Disposition of his Ground; and, besides Corn, to sow yearly no small Part with Grass-seeds; which succeeded to his Expectation. He also sowed several Acres with Flax, once and again, and had full Crops: But as he had not, till of late, an Opportunity

portunity of dressing the Lint by a Mill, he had the Misfortune of losing his House by Fire occasioned by dressing it, which has, since that Time, disposed him to discontinue the sowing of it; but now, as the Earl of *Stair* has built a Lint-Mill within a Mile of the Farm, engaged a Servant experienced in the whole Process of the Lint-husbandry, and, in particular, qualified for the several Purposes of watering and dressing, he purposes to renew his sowing of Flax, and to go deep into the Design; because he humbly thinks, that on these, or such like Soils, it will, upon good Management, with such Conveniency of dressing, yield more free Profit than any Grain-husbandry: besides, the Propagation of Lint at Home, tends to the Support of our Linen Manufactures, without a Dependence on foreign Markets. While that Dependence continues, our Linen Trade must remain on a very precarious Footing.

It is a great Recommendation of the Farming Business, that it affords a Variety of pleasant Opportunities of Thought and Contemplation. The Farmer that does not think deliberately, before he acts, may work himself out of Breath, and do little Service to his Family. There are only small Profits to be got in the beaten Paths, or common High-ways, the Generality of Farmers go in; therefore there is a Necessity to vary Schemes of Husbandry, and to leave or avoid what the Generality run upon, the scarcest Articles, when there is a Demand for them, giving the greatest Profits to the judicious and painful Husbandman. For these Reasons the Memorialist is much disposed to alter his former Method in some Respects, and to carry on the Management of his Farm in the following Manner.

He purposes to have such a Part of it as he judges is most adapted to the Purpose, to wit, that

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Part which stands most to the Clay, divided into four equal Proportions, and one Fourth always under a thorough Summer-fallow, for Wheat, to be succeeded by Pease, the Pease by Barley, and the Barley by a Summer-fallow; or, by omitting the Pease, the Fallow may be rendered triennial; and to go on in the same Order until he shall find his Ground in so good Heart, that he may, by sowing Clover with the Barley, get one Crop of Grass, and, without a Fallow, Wheat, by plowing down the second Crop, upon one or more Plowings, as Judgment may direct; which he has Reason to expect may soon happen; for Clover tilled down, is enriching, tho' the first Crop be cut, especially if it has stood on the Ground only one Year.

He purposes also to summer-fallow another Part of his Ground, namely, a loamy Soil, for Flax, to be sown as early as the Season will admit; and to have ready, in a Seed-bed, a sufficient Number of Turnip Plants, to be set out on the Lint-ground after as many Plowings as can be overtaken, at such Distances as may admit of the Horse-hoeing Husbandry, with a View to two Crops in the same Year on the same Ground, and a partial Fallow at the same Time.

By this Method of Planting, the Turnips may happen to prove as forward as were proper, or to be desired: But if Experiments shall show that planted Turnips don't thrive so well as when the Seed is sown on the very Ground designed for their taking their full Growth upon, the Seed may be drilled, leaving proper Intervals for Horse-hoeing: Or, after the Husbandry of the Flax-sowing is finished, Turnip-seed may, without Hurt to the Flax, if Care is taken, be drilled, as proposed by Mr. *Tull*, in Rows at competent Distances, set out as soon as the Flax is off, and Horse-hoed: This will keep the Ground in Tilth for a Crop of Spring Corn,

Corn, and cause the Turnips grow great enough (especially if Harvest be early, and the Winter prove favourable) for feeding Sheep in a moveable Fold to dung the Ground, or for any other Use.

By this Way all the Expence of transplanting will be saved, and I conjecture the Turnips may in this Method be better than in either of the other two Ways; for they, tho' stunted by the Flax, having their Tap-roots remaining unmoved below the Staple of the Land, their horizontal Roots, being supplied with Moisture from the Tap-roots, immediately take hold of the fresh plowed Earth, as soon as it is turned back to them; whereas the transplanted having their Tap roots broken off, and their horizontal Roots crumpled in the Holes wherein they are set, must lose Time, and be in danger of dying with Thirst, if the Weather proves dry.

Which soever of the Ways shall, from Experience, be found to be the best, that should be followed; but in either of them the Turnips will do far more than defray the Charges; and by the Horse-hoeing and the spending of them, the Land will be enriched. After the Flax and Turnips, he proposes to sow Barley and Grass-seeds; and after so many Grass-crops as shall be thought proper, Crops in a plowing Way may be taken, as Judgment, upon Circumstances, shall direct.

He purposes also to plant Cabbages, on another Part of the Farm; and for them to husband a Piece of Stubble ground, by giving it one Fur before Winter, and two in the Spring before planting; endeavouring, by these several Plowings, to level the Ground as much as possible; and by planting them at exactly five Feet distance from one another, to have Opportunity of Horse-hoeing them every Way.

If the Ground be sufficiently drained, in reasonable good Heart; and the Horse-hoeings orderly execute, and repeated a sufficient Number of Times, a large Crop (making Allowance for unfavourable Seasons) will undoubtedly be got. This Cabbage-husbandry will be equal to a thorough Fallow. The Cabbages themselves are of an improving Nature; for their Leaves, being very porous, receive much Nourishment from the Atmosphere; and, by their spreading, allow the nitrous Dews to sink down to the Roots.

These Dews impregnate the Earth, while the Sun and Wind have not Opportunity to exhale them from under the Cabbage-leaves. Besides, many of the Leaves fall and rot, and, becoming of a slimy oily Substance, enrich the Earth to such a Degree, that the very Places where the Cabbages stood, have been found to produce a better succeeding Crop than the Intervals.

The Ground being thus highly improved, as the Lord *Stair*, to whom we owe this excellent Cabbage Husbandry, has evidently shewn by repeated Experiments, a Crop of Lint, and a Crop of Turnips, managed as proposed, may be expected both the second Year; which may be followed the next by a Crop of Barley with Grass-seeds; and, after the Grass is cut, a Crop of Wheat or Barley may intervene, or the Cabbage-husbandry may be repeated for another Year.

Potatoes may also be planted, either in the common or Horse-hoeing Way; and the one or other Method, or any of the Ways I have directed *p. 163, & seq.* may be followed, as Experience shall prove to be most profitable; but in the Horse-hoeing Way, the Husbandry of them will be near equal to a Summer Fallow. As in this Method they fall only to be planted in every fifth Furrow, there is no Necessity of putting Dung, except on-
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ly where the Potatoes are laid ; so a small Portion of it will go a great Length ; and the Intervals afford them a larger Pasture, in pulverised Earth, the chief Food of Plants, than they ordinarily have in the common Way : Wherefore it may be reasonably expected, that they will grow larger in proportion : The Difference of the Extent of Ground is of small Consideration, since a Fallow and a Crop is got at the same Time.

In this Way, Parsnips, Carrots, and other Roots may be raised in the Fields, to larger Sizes than perhaps in the richest Gardens : Such is the known Advantage of Horse-hoeing for Cabbages and these kinds of Roots : And the Memorialist thinks, it is well worth remarking, that the Root and Herbage Husbandry in the Fields, seems to be the best Security against the fatal Effects of a Famine, or even Scarcity : For, had this Husbandry been general in the dear Years, the Poor had not been reduced to the Necessity of living on Arnots, Myles, or the like ; or been starved even to Death, as it is informed many, particularly in the Highlands, were, when such natural and spontaneous Products of the Earth were all ate up : This, of itself, is sufficient to show, how much it ought to be the Care of the Publick, and all well disposed Persons, to promote this Husbandry, and to render it as general as possible ; for Seasons that prove unfavourable for Grain, may be very friendly to them ; and one Year's Produce of these, may be preserved good and wholesome to another.

Further, he is of Opinion, that the plowed and Pasture Part of a Farm ought always to bear a reasonable Proportion to each other ; that, by Dung from Stable and Byre, or in the Fold, the plowed may be meliorated ; wherefore, he has divided about forty Acres of his Ground into two Parts for Pasture, and laid a great Part thereof down with Grass-seeds.

feeds. On these he purposes to keep no dry Cattle, for Milch ones give most; and his Horses are to be fed in the Stable on cut Clover. The Milk he designs to manufacture in the Dairy Way, to the best Advantage he can; and, with the Assistance of the Cabbage, Turnips, and Clover, green and in Hay, on the other Parts of the Farm, he hopes to make a good Account of it.

What remains of the Farm unemployed for the Purposes aforesaid, he proposes to keep in heart for Grain, or Grass from Grass-seeds sown, by folding or fallowing, with the Assistance of Lime, which is to be had at a convenient Distance, for a moderate Price: So all the Stable or Byre Dung, with what Lime may be thought necessary, may be applied for Improvement of the separate Parts of the Farm under the Plough; for the Pasture-part will be improven by the Dung and Urine of the Cattle pasturing.

What seems proper to be next taken notice of, is, Which Way the Remains of the Cabbages, Turnips, Clover, green or in Hay, that may be over feeding the Horses and Milch Cattle, of the Oats and Pease that may be over maintaining the Family, and the Horses, is most profitably to be spent? And this, he humbly thinks, is, when Grain is cheap, by fattening black Cattle in Winter, and House-lamb; which also contributes to increase the Quantity of Dung. He has also a strong Inclination to breed, rear up, and fatten several other very useful Creatures; such as Hogs, and Poultry of all Kinds.

Now, the Memorialist is informed, that there are certain Funds, applicable to the Encouragement of Agriculture, and the Education of Boys in the Art of Husbandry, under the Administration of you, Gentlemen, who know that Agriculture is the Support of all Arts and Sciences, and that

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when it does not prosper, these must necessarily come to a Stand. Therefore, if you are pleased to enquire into his Capacity, and if he be found qualified, and such a Sum be put into his Hands, as by you shall be thought proper, to encourage him to try Experiments, and for providing Utensils of Husbandry, &c. for that Purpose, so as he may carry on the foresaid Scheme, as it shall be corrected and amended by you, or any other Scheme you shall think fit to appoint, with Spirit, for the Example of others, (Examples having more Influence than Precepts;) he shall surely do all in his Power to give the Publick and you Satisfaction concerning his Conduct; and report his Diligence, with Accounts of Expences and Returns annually, or from Time to Time, as you shall direct. If it shall be thought proper to put Boys under his Care, with suitable Encouragement to him, he will also engage to give them the best Instruction, as well as Example, he is capable of, with respect to Agriculture.

He hopes, that if he be found equally qualified with another, you will be of Opinion he has this Argument for publick Encouragement in his Favour, That his Loss by Fire was occasioned by the Dressing of a great Quantity of Flax of his own raising; an Article highly beneficial to the Publick, as well as the Propagator.

An additional Memorial by Mr. Maxwell.

THE Society having recommended to him, to give a more full Account of the Uses to which the Roots and Herbs mentioned in the preceding Memorial may be applied, and to direct how they may be preserved from one Year to another, he the more chearfully receives the Order,

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that, from the Beginning, he intended to have done it; but restrained himself, lest the Paper might have swelled to more Length than he imagined might have been approved of. Now that he finds a further Account of these Matters will be agreeable, he offers his Opinion as follows.

Their several Uses for the Table are so well known, that it seems needless to say any Thing upon this Head; and it is certain, that they are not only useful, but very nourishing for Beasts almost of all kinds: But this, and the Manner of preparing and giving them, not being generally understood, seems therefore the more necessary to be explained.

Cabbages, Turnips, Parsnips, Carrots, &c. are good and agreeable Food for Horses, black Cattle, Sheep, Swine, and Poultry of all Kinds, if used to them from the very Beginning, which is the best Method to breed up Cattle to take them; and there is not a better Way of rearing up these Creatures, than by giving these Things to them boiled and chopped with Butter-milk or Whey, mixed with Grains, [Drass] Bran, or coarse Meal of any Sort. In this Method Foals may be bred in the House, while the Mares go to Plough or Cart; and when they come home, the Foals may be put to them. If the Young of any of these Beasts be thus accustomed, they will doubtless become greedy of such Food, which is wholesome and nourishing, and in a short Time they will take all these Things raw or unboiled. To milch Cattle it seems most advisable, to give them boiled with the Liquor; and to them, in that Way, a Mixture of Roots and Herbs is not improper; but for fattening, it is best to give them unboiled; and Cabbages, which I think are not so fattening as Turnips, &c. are more profitably bestowed on milch than dry Cattle, whether boiled or unboiled: Yea, the very Stalks
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of Cabbages, split and boiled, yield very good Juices, and therefore increase the Quantity of Milk. Those that have not been thus bred up, are very unwilling to take such Things; but the readiest Way to bring them to do it, seems to be, to cut them small, give them with Corn, and by Degrees to increase the Quantity of them, and diminish the Corn; by so doing, in a short Time they will take them without it. As for Sheep, it is a good Way to get some that have been used to Turnips, and to give the whole Flock these and other Roots mixed. Roots and Cabbages are also good Food for Poultry, and they will take them readily, if boiled, drained, and chopped with Meal of any Sort: Indeed a greater Proportion of Meal may be necessary at the first, than when they are used to such Food.

For the Preservation of these Things, from one Year to another, the following Methods have been found effectual. Build a House on dry, sandy, or gravelly Ground, and dig the Earth below it in the Form of the Pit of a Kill; then stir the Ground a little, and place as many of your Roots upon it as can ly, without putting one above another; above them lay Straw, as the Bedding of a Kill; and above the Straw, Earth about half a Foot thick; above the Earth, Roots; and so on while you have Roots. Then take Thatch, and opening and spreading the Sheaf, set it on End, all around the Side of the Pit, and set Cabbages, with the Roots in Earth, laid upon Straw, of about the same Thickness as for the Roots, all along leaning to the Thatch straw; and within them as many more Cabbages, in the same Way, as the Place can contain. Then bed above the Cabbages with Straw, and put in Earth of a like Thickness, as afore-mentioned; and upon it more Cabbages, placed in the same Form and Order, till they be all pitted; then a large Quantity of Earth above all. Or, the Roots
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and Cabbages may be put into different Pits, that you may have the Use of both at the same Time.

If the Cabbages and Roots be taken up dry, and so put into the Pit, and kept so, which the House serves to do, as also to preserve them from being stolen, there is small or no Danger of their rotting, and the Want of Air prevents their growing; for want of a House, when it cannot conveniently be got, the Pit may be covered pretty thick with rank Horse-dung. Thus kept, the Memorialist has ate Cabbages, sweet and tender, in *April*, in the famous Mr. *Heron* of *Bargally's* House; and he is informed, by the ingenious Mr. *Hope* of *Rankeilor*, of a foreign Way of preserving them, by cutting them small, and salting them up in Hogheads. This Mr. *Hope* observed in his last Travels; and he says they eat well, and are reputed a good Dish for the Table in the Spring. Potatoes may also be preserved in the other Ways directed, Page 173. & seq.

The Memorialist might go further, and give Directions for fattening black Cattle, &c. but fearing he might offend, by being more prolix and tedious; as also hoping, that what is here said, joined with that Part of his first Memorial relating to the Subjects of this, discharges him in a good Measure of the Commands laid upon him by the Society; therefore, as he intends to give only a Specimen, but no System of Husbandry, he drops his Pen until some other Occasion, which perhaps he may take, especially if he meets with Encouragement from the Honourable Society.

REPORT of the Honourable, the Society of Improvers in the Knowledge of Agriculture, in favours of Mr. Maxwell.

AT *Edinburgh*, the 13th Day of *February* 1740 Years: The Committee appointed by the Society for improving in the Knowledge of Agriculture upon the 6th of *January* last, having this Day met; they, among other Matters, (after chusing the Right Honourable the Lord *Reay* Preses) took under their Consideration the Memorials given in by Mr. *Maxwell*, (one of their Members) to the Society for propagating Christian Knowledge; which Society had recommended it to Mr. *Maxwell* to obtain our Judgment upon the said Memorials; and we, having fully considered the same, are of Opinion, that the Scheme of Husbandry therein contained is very useful and practicable, and that the same will tend very much to the general Good of the Country, if put in Practice; and particularly to those Parts in the *Highlands*, where the Knowledge of right Husbandry is much wanted; and where those that are instructed by him may be thereafter established by the Society. We are fully convinced, that Mr. *Maxwell* is not only capable, being in the Practice of the greatest Part of such Husbandry, but will prove diligent in such an Undertaking, he having on several Occasions discovered his Abilities to us, and his Sufficiency to execute all the Purposes mentioned in the Memorials.

In order that Mr. *Maxwell* may be enabled to carry on the Design with Spirit, we are of the Opinion, that, if the Society would give him the Loan of at least two hundred Pounds *Sterling* for five Years, without Interest, in Consideration of his Trouble, and for his Encouragement, it would be

be well and profitably bestowed ; he giving Security for the Repayment of the Principal, and to take yearly under his Care four, five or six young Men, not under the Age of sixteen, from the Society's Schools, or any others they shall think proper, to be by him instructed in all the Parts of Husbandry mentioned in the Memorials, and to continue with him for the Space of three or four Years, as the Society shall think fit, he entertaining them in Bed and at Board, and the Society paying him the Sum of three Pounds *Sterling* yearly, at the least, for the Maintenance of each of them ; since it is plain, that such young Lads, not inured to Labour, can be of very little Service to him for the first two Years, and that this is less than he can maintain them for.

We are also of Opinion, that the Society should, in a particular Manner, enjoin Mr. *Maxwell* to teach these Lads, not only the Flax, but also the Root and Herbage Husbandry, both by the Plough and Spade ; since, as he very well observes, the first tends to the Support of our Linen Manufactures, and the last are Food for Man and Beast, and so may give Relief when Seasons prove unfavourable for Grain, without diminishing the Quantity thereof, seeing they may be got in place of a Fallow, and that the compleat Husbandry of them makes a thorough and a good one : Besides, he ought also to be engaged to teach these Lads the different Uses of them, for breeding up and feeding Sheep, Swine and black Cattle ; and also the Management of these useful and profitable Creatures the Bees.

The above we think are the lowest Terms Mr. *Maxwell* can undertake for, considering, among other Things, how subject Roots and Herbs in the Fields are to be stoln ; but, if the Society do not incline to proceed in this Method, but chuse rather to give Mr. *Maxwell* an annual Sum for ex-

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ecuting the Purposes aforesaid, we are of Opinion, that he richly deserves, at the least, the Sum of 30 Pounds *Sterling* yearly, for the Space of five Years or longer, if the Society think fit to continue Lads with him, for their Maintenance and his Trouble; and we believe such Conduct, on the Part of the Society, would receive a general Approbation.

R E A Y.

Subsequent to this Report of the Society of Improvers, a Committee of the Society for propagating Christian Knowledge were pleased to approve of my Memorials; and to inform me, that they resolved to encourage the Design, but that Difficulties were in the Way, which required Time to remove. When these are overcome, there is no doubt but they will, without Loss of Time, act in pursuance of a Charter obtained by them for a Purpose so highly commendable; a Purpose tending to promote Industry, which is an Ornament to Christianity, and recommended by the Gospel; a Purpose conducing to supplant and undermine Idleness, the Parent of Vice, the Mother of Mischief, the Bane of Society, and the Destruction of every Country where it prevails.

I submit to the candid Reader, if I had not Reason in the Year 1743, (when I published these two Memorials, and what was thereto, as is above, subjoined) to think that the Society would, long ere now, have done Things very remarkable and exemplary for the Promotion of Husbandry in pursuance of the Charter; for, was not the Expence of obtaining it, debursed from their Funds, considerable? But, what Part of them have they applied to that Purpose? If they have neglected this
Appli-

Application, is not the Interest of the Money laid out in obtaining that Grant lost? And will it not be lost so long as they continue to postpone the Purposes of it? Strange Management of these, whose revealed Intention is to promote the temporal and eternal Welfare of Mankind! But, if a Part of these Funds have been destined by the Donors for Husbandry, how are they discharging the Trust reposed in them? and how great is the Distress of our People, by the Neglect to promote the Husbandry of Potatoes, Turnips, Carrots, Parsnips and Cabbages, which I, as above, recommended? Would a Famine have happened? Or, can it be supposed that, according to the natural Course of Things, it will ever happen for any other Cause, than the Neglect of the Husbandry of Roots and Herbs? For, was not the Crop of so many of them as were sowed or planted for the Year 1756 good? In what Season have they in any Place failed, when the Husbandry of them was proper? How small Quantities of Ground will produce immense Numbers of them? And, will not that Ground yield, in the next Year, about double the Quantity of Corn that it would do by the common Husbandry?

How profitable and beneficial is the Husbandry of Roots and Herbs? Has not the Crop of one Acre of Ground in Potatoes, given 20. or 30 *l. Sterling*, when they were not half the Price they have given in this Year? Has not one Cabbage weighed more than forty Pounds, one Turnip in the Root near thirty Pounds, the Root of one Carrot or Parsnip five Pounds or upwards? And are not the Branches of Potatoes, Parsnips, Carrots and Turnips, very nourishing Food for Sheep, black Cattle and Hogs? Have they not been raised in the Fields to their several Weights fore-mentioned, by the Means of Labour only? Do not these so raised, near as much exceed in Tenderneſs and Taste,

Taste, those in the Gardens nursed with Dung, as an Apple doth a Crab? And how much wholesomer are such as are raised without Excrements, than those that have them in their Mouths when we eat them? Are not six Inches square, sufficient for the Nourishment of a Carrot or Parsnip? one Foot for a Turnip, and about 25 Inches for a Cabbage? And if so, in one Acre *English* there may grow 174,240 Carrots or Parsnips, or 43,560 Turnips, or 10,036 Cabbages; for a Statute Acre *English* contains 6,272,640 Inches square; and in a *Scots* Acre, greater Numbers may grow, in Proportion as 18 exceeds 16 $\frac{1}{2}$, which is the Difference betwixt a *Scots* and an *English* Acre. I have shewn how one Year's Product of them may be preserved good and wholesome, until another comes.

If Butter, and all Sorts of Fleshes, have been as cheap in every Season of this Year, as at the same Times of several Years by past; and if Roots and Herbs had been plentiful, which would have kept them low priced; the certain Consequence thereof would have been, that our People would have eat them, to save Bread, with Butter or Flesh, and so would have lived well and plentifully: For, in this Case, the Price of Grain would not have been immoderate, even without Importation, and then the immense Sums sent out of the Kingdom in the several Years last past for it, would have been all saved.

But let us carry our Thoughts a little into Futurity, and consider what will become of us, if the Seasons shall continue to prove unfavourable for Grain? we, to follow our present Husbandry, and the Enemy to take our Ships importing Corn, if those who have the Management of our Funds, applicable to the Promotion of Agriculture, even such as should be exemplary for, and Patrons and Promoters of Religion, Humanity, and every Vir-

true, shall continue to act the Parts that to me they seem to be acting?

I have considered myself, as a Member of the Community, called on this Occasion to my present Behaviour; for the Voice of the People cries aloud, *Distress, Distress and Anguish*! If then there are such, who, living in Plenty and Ease, have fallen asleep, and are become insensible of the general Sufferings of their Fellow Creatures, which they ought to have endeavoured to prevent, should not they be awakened and roused up? For my own Part, I think he does not love his Country, who can, without more than ordinary Concern, see the Cause of its Misery, and the Remedy plain, easy and certain, but not applied.—If Warmth is at any Time becoming, it is when the greatest publick Interest is at Stake.

I am not the first, who has animadverted upon the Conduct of the Society. The anonymous Author of a late Pamphlet, intitled, *Political Observations, occasioned by the State of Agriculture in the North of Scotland*, has used the following Expressions.

“ As the Government intends to reform the
 “ *Highlands*, and have appropriated Funds for that
 “ Purpose, his Majesty’s Royal Bounty of 1000 *l.*
 “ *per annum* to the Church of *Scotland*, ought to
 “ be distributed for the Encouragement of Hus-
 “ bandmen, Manufacturers, Fishers and Sailors,
 “ in different Places of the North.

“ Popery in *Scotland* is a mere Bugbear; it has
 “ lost all its wisest Priests, and all its powerful Pa-
 “ trons. Throughout all our Nation, we have
 “ more Christian Knowledge, and less Popery than
 “ in *England*: We want nothing but their Liberty,
 “ their Arts and Industry.

“ At the Meeting of the Committee for manag-
 “ ing the Royal Bounty, an indifferent Spectator
 “ would

“ would naturally imagine, from the Accounts given by the Northern Clergy, that a Reward of 200 Pounds was to be given to that Minister who had most Papists in his Parish : In short, the poor Papists are as much increased in their Numbers every Year, as *Falstaff*’s Men, and by the same Power of Imagination.

“ The Society for propagating Christian Knowledge, are more than sufficient for all the Purposes of Religion in *Scotland*. They may also be useful in promoting Agriculture, Manufactures and Fisheries.

“ Most People in the South imagine, that all religious Funds should be employed in converting Papists ; but the Number of these is contemptible, and the proper Division of religious Parties in *Scotland*, is not that of *Papists* and *Protestants*, but that of *Presbyterians* and *Nonjuring Episcopalists* ; and it is of more real Advantage to Society, to instruct twelve Boys in the useful Arts, (whose Education makes them fit to serve their Country) than to educate one hundred spiritless Papists : The Hands of useful Men ought to be strengthened as much as possible : The natural Progress of Arts and Religion, will not leave one thousand Papists in *Scotland* in thirty Years.

“ As the Society have been of small Use to Religion, but of none to Liberty, the Government, if possible, should take their Funds into their own Hands, and apply them effectually for promoting Liberty, Religion, and every useful Art.”

As a Letter to the Printer of the London Chronicle, and from it published in the Edinburgh Courant, shows the high Value of the Potatoe-husbandry, and the Salubrity of that Root, I shall give it a Place here. It follows.

S I R,

AT a Time when the Nation is in such extreme Distress for want of Corn, it may not be amiss to point out a Method by which People may be kept, and kept well, without any Corn or Meat at all. I am a Farmer in Staffordshire, I rent 400 *l.* a-year, and have three and twenty People in Family. And as (though my Farm is large) my Fortune is but slender, my Business is to support my numerous Family on as cheap Terms as possible. Which I do thus (and have by this Method maintained my People for some Years with very little or no Bread, except what has been used on particular Occasions, as on Visitors coming to the House and the like) I plant every Year four Acres of Potatoes, which answer all the Purposes of Wheat. For with them we make Puddings and Pies, and boil or roast them for Bread; and we like them better than your Bread; for, besides their being much sweeter, there is no Allum, nor such Sort of Gear, mixt with them, as you have in your Bread in Town. My Potatoes I keep all the Year, and they always eat well, and I preserve them from the Frost in the Winter thus: I don't dig them up till about *Michaelmas*, because if taken up sooner they don't so well: As fast as they are dug up, I put them into Pits, which I dig about a Yard deep in the Earth: When the Pits are full, I lay over them first some Pease Straw, and after that some fresh Horse-dung, and then the Mould

Mould dug out over that, and beat it down close. And thus they will keep well all the Year.

In my Family we keep them always boiled in the House, and in the Morning my People eat Milk and Potatoes. At Dinner they have generally Bacon or hung Beef and Potatoes; and for Supper we mash our Potatoes, and add Milk and Salt to make a Pudding; and sometimes for a Change we have Potatoes fried in the Fat that is left in the Pan after frying Bacon or Beef; and we also make Pies with Potatoes and Mutton or other Meat. And I thank God there are no People healthier or stronger than mine. And this, if you please, you may publish in your Paper for the Information of others, for it is true.

I am Yours, &c.

H. S.

December 1756.

LETTER by Mr. Maxwell to the Honourable, The EDINBURGH SOCIETY, for Encouragement of Arts, Sciences, Manufactures, and Agriculture.

Quid est in his, in quo non naturæ ratio intelligentis appareat?

Tul. de Nat. Deor.

GENTLEMEN,

I HAVE seen your Advertisement for the Year 1756, wherein a Premium is offered to the Person who shall frame the best Articles, on which a Lease of Lands may be extended, whereby the Ground may be laboured to the Advantage of the Tenant, and without Prejudice to the Master.

To frame such Articles as may be best in all Cases, I humbly think, is a very difficult, if not an impossible Matter, Soils, Situations, and Circumstances, varying so frequently, and so greatly. But, as every Man who loves his Country, and
thinks

thinks himself only tolerably qualified, should use his Efforts to contribute to the Promotion of your most laudable Design, I shall mention the Method which I, with Submission, think Proprietors and Farmers, who incline to enter into Leases, should take to know the Extent and Qualities of the Farms, how they ought to be inclosed, how to be divided, and how to be improv'd thereafter: Then I shall offer my Opinion, how, without pretending to hit every Case exactly, they should be managed by the Tenants, and shall show, that that Management (if the Farms are moderately rented) must prove highly profitable to them during their Leases, and to their Masters subsequently; and that, in order thereto, they should agree to be bound to the Performance of certain Conditions, which I shall mention.

Without such Covenants, and the Performance of them, I am afraid the Improvement of the Agriculture of our Country will go on slowly: All possible Pains should therefore be taken, to persuade Farmers to comply to Rules profitable for themselves, profitable for Masters, and profitable for the Kingdom; and, being persuaded, to get them bound to Performance: For many of them are ill to persuade; and many, once persuaded, are apt to revert to their unreasonable and destructive Practices; Practices destructive to the Ground, and so to themselves, to their Masters, and every Inhabitant of the Land we live in; for the Success of Manufactures depends upon the Plentifulness of Provisions; and the Success of Trade, at least, the chief Value of it to a Kingdom, depends on the Success of Manufactures; for some Kinds of Trade, tho' they may enrich some, must be prejudicial to a Country. Now, if so; if Husbandry is the Stock, and if Manufactures and Trade are only the Improvements of it, I persuade myself.
that

that your chief Attention and Care will always be employed, in diffusing the Knowledge of the Principles, and spiring up and promoting a rational Practice of it.

To know the Extent and Qualities of Farms, how they ought to be inclosed, how to be divided, and how to be improved thereafter, Proprietors and Farmers should, before they enter into Leases, cause them to be measured and planned by a Surveyor, who has established the best, at least a good Reputation for the Knowledge of Soils, and the various Improvements of them: One capable to write a sensible and distinct Memorial concerning the Cultivation of the several Fields; as he shall have laid them out, and described them in his Plan: A Memorial directing Practice consistent with rational Principles. Such a Plan, and such a Memorial, I believe, you will allow would mightily contribute, to open the Eyes of the less intelligent Proprietors and Farmers, and let them see what they ought to ask and grant respectively.

Thus to begin, is surely consistent with Prudence, and would be highly useful; for it would assist Parties to frame the most profitable Articles, which, in all Cases cannot, I believe, be thought of by any Man, without seeing the Fields, or hearing them fully and justly described.

Altho' the Soils, the Situation, and the Circumstances of Farms differ so frequently, and so much, that I apprehend, as I have in Part said, it is next to an Impossibility to frame such Articles in any Paper that can be presented to you, as can be best and sufficient in all Cases; yet I shall offer my Opinion, how, without pretending to hit every Case to the greatest Exactness, Farms should be managed by Tenants, and shall show, that that Management, if Farms are moderately rented, must prove highly profitable to them during their

their Leases, and to their Masters when they are expired.

I. Tenants should be bound to inclose and divide, betwixt and the Term, or Terms which shall be agreed to, such Parts of their Farms as have been plowed, and such as are plowable, in such Proportions and Manners as should be described in the Plans, and must be specified in their Leases, and also bound to preserve and uphold the Fences, and to leave them sufficient.

I foresee that Objections will probably be made to this, and, perhaps, to every Article that I may propose; but I shall endeavour to weaken the Force of such of them as may occur to me.

One Tenant may honestly say, I am not able to inclose and divide the Ground: Another may refuse, and alledge, he would act as a Fool if he did, unless he got a very long Lease: So the Length of the Lease, the last insists for, must be complied to; or otherways the same Offer must be made to him, that of Necessity must be given to the first, unless the Proprietor chuses to seek for other Tenants; namely, the Expences shall be allowed out of the Rent, the Interest thereof at *per cent.* being paid as additional Rent. Now, altho' no higher Interest be demanded than *5 per cent.* in which Case the Tenant would be unwise to refuse, the Master would evidently be a great Profiter, as such a Transaction would be equal to, or better than buying Land at twenty Years Purchase; and still a greater Profiter, if the Tenant would agree, that Trees, to be preserved by him, should be planted by the Master in Hedge-rows, and in the Angles, at the Corners of the Inclosures: The Loss to the Tenant by the Trees would be small, the Profit to the Master would be great, and the Country would be ornamented and enriched.

II. Tenants should be bound to drain in an effectual Manner, and betwixt and a Term, or Terms to be limited, all such Parts of their Ground as may be hurt by a Stagnation of Water ; which Parts should be particularly described in the Plans, and in the Leases.

If Farmers shall object in this Case, as in the immediately preceeding, Tenants who will comply should be sought for. If they cannot be found, Masters will do well to lay out the Expences on the same Terms, and for the same Reasons, in this Case, as in the former.

III. As the Deficiency of the Crops, which the Husbandman sows or plants, is often, in a great Measure, caused by the Prevalence of Weeds : As a well ordered Summer-fallow tends to the Destruction of the Weeds, and the Increase of his Crops : As almost all the Ridges in this Part of the united Kingdoms are formed in a most disorderly and disadvantageous Manner ; and as there is no Way in which they can be, with so small Danger, and so great Profit, altered into a proper Form, as they may be in the Course of one Year's Summer-fallowing : Therefore, Tenants should be bound to Summer-fallow one Inclosure in every Year of their Lease, from the Commencement of it, until the whole Fields are once Summer-fallowed ; and should be bound, when Summer-fallowing, first, to plow down the whole Ridges of each Field into a Plain : Then, beginning at one Side, to form new Ridges perfectly streight, and of an equal Breadth in all their Parts, and thereafter to raise them only so much, that the Rain Water may glide from the Top to the Furrows.

Ridges thus formed, perfectly well admit of ploughing in Pairs ; and each two of them being ploughed to other, and from other alternately, they can never become higher or lower ; nor will

H h h their

their Form be in any Respect altered, which is highly convenient and profitable.

As to the Breadth of Ridges, I think ten Foot is generally the best; for if Weeds should prevail, or if, for any other Reason, the Farmer should sometimes incline to Horse-hoe, he can then easily divide them into five Foot Ridges, which I think is the properest Breadth for that Purpose.

No material Objection against what I have said, concerning Summer-fallowing, and the reforming of Ridges, occurs to me. If ten Foot Ridges be thought too broad, by dividing them into two, they will be narrow enough; and if they be thought too narrow, by putting two of them into one, they will become sufficiently broad.

IV. Tenants should be bound to sow, for the first Crop of the Field, which shall be first Summer-fallowed (after manuring it, as shall be agreed to) Wheat, or Rye, or Oats.—For the second Year's Crop, Pease, or Beans, or those mixed, or Turnips, or to plant Potatoes, or Cabbages.—For the third Year's Crop, to sow Barley, or Bear, or Flax, or Oats, and Clover and Rye-grass Seeds with these or any of them.—For the fourth Year's Crop, to cut the Grass once, and either to plow down the second Crop, or to pasture it, at the Option of the Tenants. But if pastured,—For the fifth Year's Crop, to cut the Grass once, and either to plow down the second Crop, or to pasture it also, at the Choice of the Tenants.—But, if this second Crop is not plowed down, to pasture the Field only, for the sixth and seventh Years Crops, allowing the Tenants, at any Time thereafter, either to plow the Field, or to continue to pasture it as they please; but they should be bound, when they plow it, to observe and repeat, without Variation, the Order of sowing and cropping it fore-mentioned, for the same Number of Years. They should
also

also be bound to practise the very same Husbandry on the rest of the Fields, one after another, when they are Summer-fallowed as aforesaid: Which Husbandry will, you see, shut out the destructive Practice of sowing for a robbing Crop, immediately after a robbing Crop, or Crops, in so far as Tenants can be prevailed upon, to become bound to the Observance of the Rules I have offered.

It is impossible for me to imagine every Thing, that every Man may incline should be taken notice of by me: The Society consists of a great Number of benevolent and beneficent Gentlemen, and it has been said, that *so many Men have so many Minds*.—If it shall be objected, That I have framed no Articles for the Husbandry of Madder, Woad, Saffron, Liquorish, Hops, and many other profitable, tho' uncommon Plants: I answer, That I am writing no Book of Husbandry; that these are more proper for the Gardiner's Care, than the Husbandman's: And besides, that I am unwilling to do a Thing that I think would be needless in the present Case; for I doubt if any one of our Tenants of the present Age, will be bound to the raising of any of them, in any great Quantity, without a very high Premium.

If it shall be observed, that I have spoke of the manuring of Ground in a general Manner only, and have framed no Articles concerning Liming, Marling, Water-fattening, or Denshiring; I acknowledge the Charge. But, as I have concerned myself with laboured Ground only, because I thought I was no further called by your Advertisement, I am of Opinion, that Denshiring, or Paring and Burning, can, in very few Cases, be practised upon it with Safety to the Master, and that therefore Tenants should rather be bound, not to practise it on laboured Ground.

With

With regard to Water-fattening, it can seldom be right practised, until our Ridges, which are almost universally deformed and irregular, are reformed: And, indeed, until then, the Labour and Expence of Water-fattening, or Liming, or Marling, would be in a great Degree lost, by the tossing and tumbling Work necessary for that Purpose, and by the unavoidable burying of the manured Earth in the old Furrows. But Parties, and their Clerks, must be very dull, if they cannot frame Articles proper for these, when Cases can reasonably admit of them.

As Husbandry consists of a great Number of Parts, I might have indeed gone on, and proposed many other Things, such as Trenching, sometimes Horse-hoeing, or more Summer-fallowing, the sowing of St. Foin, Lucern, Carrots, Parsnips, &c. But what good End could my so doing have answered? Is there a *Scots* Farmer of five Hundred, who practises any of these, or such uncommon Parts of Husbandry? Or would one of a Thousand of them, do you think, condescend to become bound to do it at their own Risque and Expence? I apprehend they would not: For which Reason, I have chosen as above, a plain and easy Plan, as little as I could different from the Practice of many Farmers, in Hope, that the greater Number of them may be persuaded to comply, to be bound to the Execution of it: A Plan which, deliberately considered by the intelligent Farmer, must appear to him greatly preferable to the common Husbandry: A Plan, which must prove highly beneficial to him, and to his Master subsequently, if fully executed; as it is a Plan, by which, if Masters do not allow their Tenants to deviate from it, the Ground once brought into the Order proposed, can never grow worse, but must grow better, the Dung arising from the Consumption of the Fruits of it, being
only

only prudently applied to it, as I could make plain to any Farmer of an ordinary Capacity, if he was not prejudiced, and so, obstinate and invincible; for an enriching and cleaning Crop always immediately following a robbing, the Ground cannot be in need of above the Half of the Dung, if so much, that would be necessary for it in the common Husbandry. But, fearing I have already trespassed, I stop, that I may not become greatly indiscreet and presumptuous, by using Arguments or Illustrations, when I am writing to a learned Society.

This Plan is suitable to all Soils, except Peat Earth, or Moss, which is no original Soil, and which I purposely avoided to speak of, as I am afraid Masters must, at their own Risque and Expence, shew the Practibility of the Improvement of it, and also the Profit thereby arising, more than has been yet done, before Farmers will become bound to improve much of it at their own Hazard.

I believe Moss is a very valuable and improveable Subject: But I suspect the proper Improvement of the several Kinds of it, is not known by many; for few Authors have touched this Branch, and these few have done it, as if they had been afraid. A Countryman of our own indeed, several Years since, wrote an Essay on the Improvement of it; wherein, I believe, he described the Nature and Qualities of it to the Satisfaction of his Readers, and gave several Hints at the Improvement of it; but still, and no Wonder, as he could get little or no Assistance, there is Room for many Additions, and perhaps for some Alterations, of which, I know, he is sensible, and for which Reason, I believe, he intends, in a short Time, to endeavour to serve the Publick further, by writing again on it and other Subjects; for which Reason also I here leave it untouched.

Gentlemen,

Gentlemen, I have almost gone through what I intend to say to you on this Occasion. If you shall judge, that this Letter contains the best Articles (offered, or to be offered to you at this Time) on which a Lease of Lands may be extended, whereby the Ground may be laboured, to the Advantage of the Tenant, and without Prejudice to the Master, I most humbly submit to you, if it is not reasonable to judge these Articles to be also the best Invention in Arts or Agriculture, which may be presented to you for this Year; seeing it must be confessed, that Agriculture is the Foundation, and the Life, and the Support of every Art and Science: I have taken Pains to serve my Country, and please you, and shall guess from the Reception that this meets with, whether you incline that I should make any such Attempt hereafter.

If the Dissertations you may now receive, on Soils and their different Natures; on the Nature and Operation of Manures; and on Tillage, or any of them, do not give full Satisfaction, they, or such of them as may be called for by you in the next Year, may perhaps come from my Hand: I intended to have offered them now, but changing my Intention, have delayed until I know the Fate of this Letter.

I am, Gentlemen,

Your most obedient, and most

humble Servant,

AGRICOLA.

I O W N that I wrote the above Letter, signed *Agricola*, and I hope it will be acceptable to the Publick: At the same Time, several Gentlemen offered their Thoughts to the Society on the same Subject; but the Premium was given to *John Swinton* Esq; younger of *Swinton*, Advocate.

As it must be presumed, that the Premiums are given by the Society for the Benefit of the Publick; and as the Community, no Doubt, suppose that Mr. *Swinton*'s Paper is very valuable, they are, probably, impatient to see it published: Several Gentlemen have told me so.

There is as little Doubt but that every Gentleman who offered his Thoughts to the Society on the same Subject at that Time, expects that it will then appear, without any Change or Variation from what it was when the Premium was given to him: They had a Right to Justice, and, I think, they have now a Right to form an Opinion, on comparing his Paper with their own, whether they got it or not.

I offered my Letter to the Society in the very same Words, and these in the very same Order in which it is above published: This must bar all Grounds for any Supposition of my having the least Intention to show, by any indirect Method, that these Gentlemen of the Society, who were by the other Members of it chosen Judges of the Matter, have determined partially.

Thus I have thought proper to use my Paper, in Hope that it may be serviceable.—If Mr. *Swinton*'s Paper is published by the Society, or by himself,

self, in any Respect altered from what it was, when the Premium was given to him, I shall possibly take Notice of the Alterations. — If the Publication is delayed, perhaps I may, ere long, satisfy many who are impatient to see it, by publishing a genuine Copy of it, with Remarks.

F I N I S.

I N D E X.

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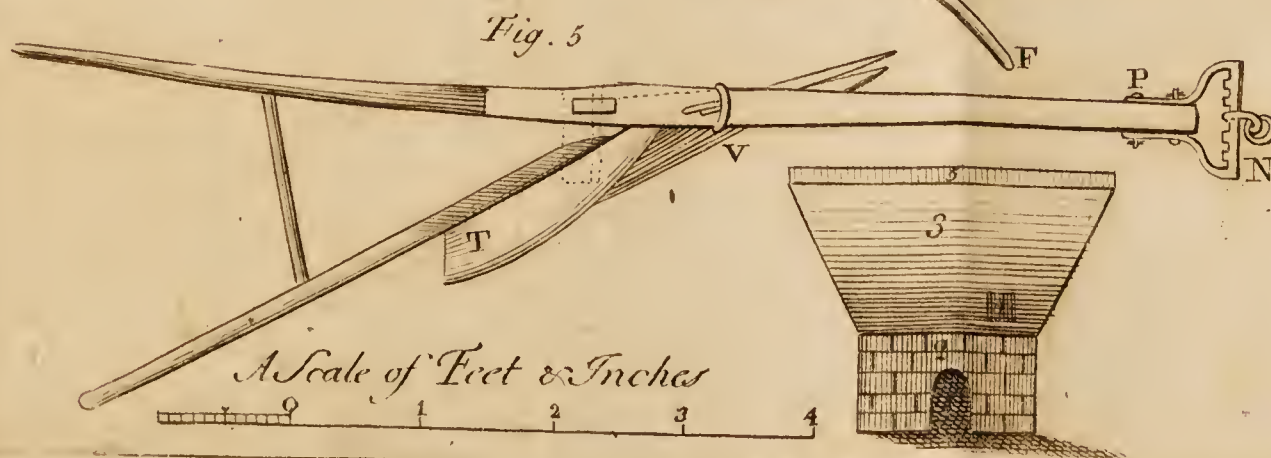
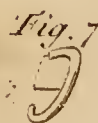
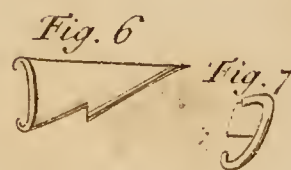
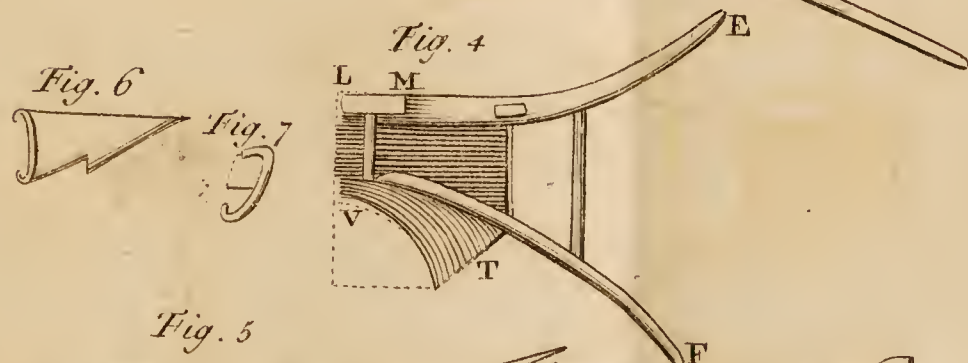
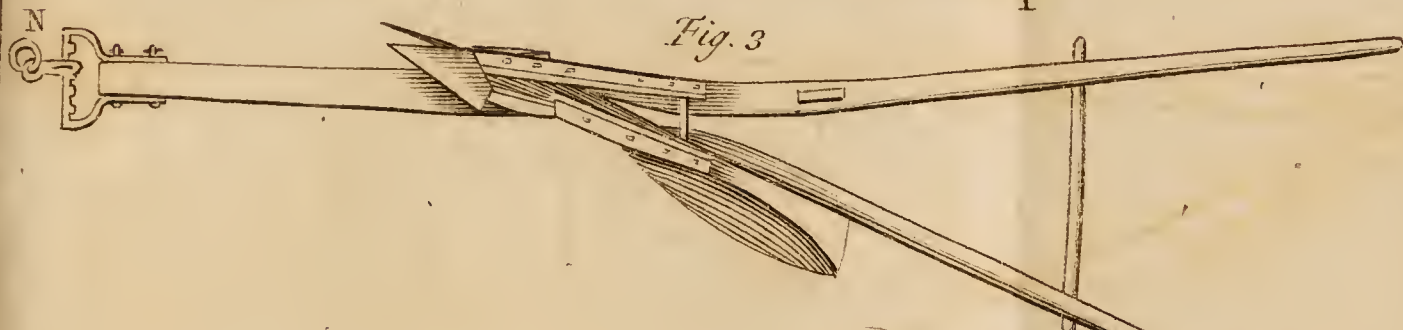
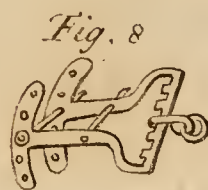
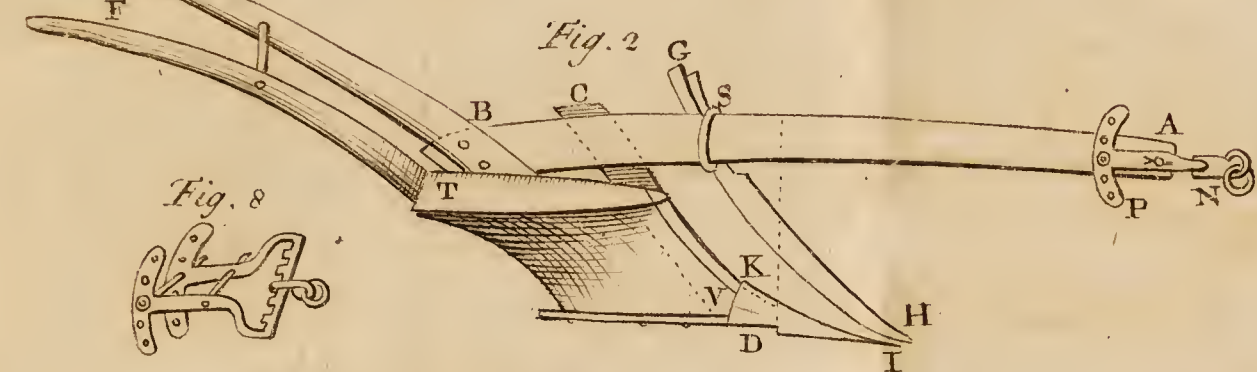
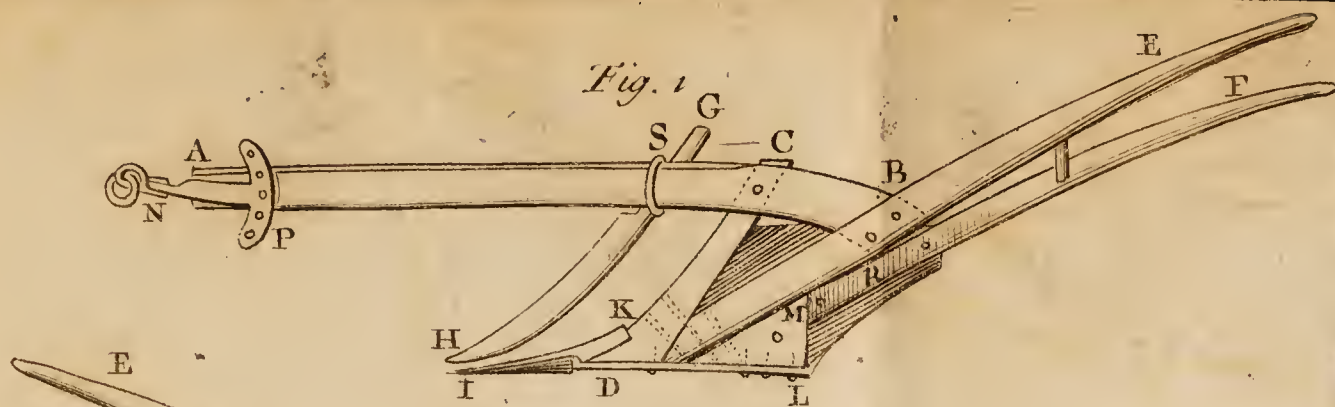
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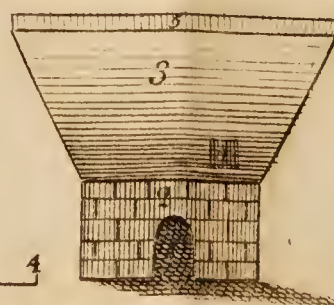
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A Scale of Feet & Inches



Explanation of the Plate hereto annexed, representing the Rotheran-plough made in Scotland some Years ago by Mr. Lummis.

Fig. 1. Represents the Left or Land Side of the Plough, in which AB is the Beam, CD the Sheath, EBD the big Stilt, FR the little Stilt, GH the Culter, KI the Sock or Share, NP the Bridle, S the Sly-band, ML a Piece of Wood in Place of a Head. The Figure of all these different Parts, as they appear on this Side of the Plough, are here represented, and their Sizes and Distances may be measured by the Scale of Feet and Inches.

Fig. 2. Represents the Right Side of the Plough, with all the Parts that can be seen on this Side, in which TV is the mouldy Board, &c.

Fig. 3. Represents the under Part of the Plough, in which may be seen the Shape and Size of the Share, and how it is fixed on the Sheath and mouldy Board, Plough Sole, Shone, Angle they make, and mouldy Board, &c. as they appear below, or looking on the under Side of the Plough.

Fig. 4. Represents the hinder Part of the Plough, in which are seen the two Stilts EF, hinder Part of the mouldy Board VT, and Piece of Wood in Place of the Head LM, in their proper Shapes and Sizes by the Scale.

Fig. 5. Represents the upper View of the Plough, or as she tills, in which may be seen the several Parts, as they appear on this Side, the Bridle NP, mouldy Board TV, &c. in their several Shapes and Sizes *per* Scale.

Fig. 6. The upper Part of the Sock or Share.

Fig. 7. The Sock, as it is fixed on the End of the Sheath and mouldy Board.

Fig. 8. The Perspective of the Bridle.

The whole of this Plough ought to be made of Ash or Elm, and the Irons should be steel'd and well tempered; and that Part of the Plough which is under Ground in tilling ought to be covered with Plates of Iron.

The Difference betwixt this and the common Ploughs, seems to consist in the Bridle at the End of the Beam, by which the Ploughman can give the Plough more or less Land by the Notches at N in *Fig. 3* and *5*, or make her plough deeper or shallower by the Holes at P in *Fig. 1* and *2*; in the Culter and Share, which are made and set so as to cut off the new Furrow without tearing; and in the mouldy Board, which is of such a Fashion as first to raise a little, and then gradually turn over the new cut Furrow with the least Resistance: And the Advantage attending such Ploughs must be an easy Draught; so that two Horses are able to do the Work of four, which is found by Experience, when tried, on all arable Grounds.

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